MINNESOTA MEDICINE

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association Northern Minnesota Medical Association and Minneapolis Surgical Society

VOL. VII OCTOBER, 1924 No. 10

ORIGINAL ARTICLES

NASAL DEFORMITIES*

GORDON B. NEW, M.D.

Section on Laryngology, Oral and Plastic Surgery, Mayo Clinic

Rochester, Minnesota

I am reporting six cases to illustrate the method of treatment of certain types of nasal deformities, including saddle-back deformities, humps, angiomas, the use of full thickness skin grafts, and the reconstruction of part of the lower third of the nose.

Fig. 1 (Case A455091). Saddle-back nasal deformity.

CASE 1 (A455901). *Saddle-back deformity.*—The patient came to the Clinic February 9, 1924, for the correction of a nasal deformity following an accident ten years before. He had had no treatment or operation since then (Fig. 1). A lead pattern was made of the size of the cartilage that would be necessary to fill the deformity. Under block and local anesthesia, a piece of cartilage from the eighth rib was removed. Then an incision was made in the columella below the tip of the nose, and by means of small, curved, blunt-tipped scissors a pocket was made over the bridge of the nose, care being taken to stay close to the nasal bones. The piece of rib cartilage, after being shaped to the correct size, and the perichondrium being removed, was inserted to elevate the deformity, and the incision closed with dermal sutures. Figure 2 shows the patient after operation.

Comment.—Saddle-back nasal deformities are best treated by the insertion of rib cartilage, which can readily be taken from the seventh or eighth rib, under local anesthesia. It may be inserted either through an incision across the bridge of the nose, or one just below the tip in the columella. The latter incision is less noticeable, and the results in this group of cases are very satisfactory.

CASE 2 (A454026). *Nasal hump.*—Ten years before examination at the Clinic, the patient had bumped the bridge of the nose, and the nose had always been a little larger at this point. Ten months before, a similar accident occurred and after this, an enlargement of this part of the nose was noticed. Examination January 29, 1924, revealed a bony thickening over the lower end of both nasal bones. The thickening was quite hard, but did not feel like a neoplasm (Fig. 3). January 31, 1924, under local anesthesia, the bony hump was rasped off. The incision was made inside the left nostril about 1.25 cm. above the vestibule.

Fig. 2 (Case A455091). Saddle-back nasal deformity corrected by inserting a piece of rib cartilage through an incision in the columella just below the tip of the nose.

Through this incision, by means of small, blunt-tipped, curved scissors, the skin and subcutaneous tissue was elevated over the bridge of the nose. The bony hump was then rasped off by means of specially made rasps of varying coarseness, which are carried up through the incision, and the bone removed. Following the removal of the hump, gauze pressure was applied by means of adhesive plaster on

*Read before the Southern Minnesota Medical Association, Mankato, Minnesota, May 19, 1924.

the bridge of the nose. At the same time a vaseline pack was inserted into the left nostril, thus preventing the formation of a hematoma. The intranasal gauze pack was removed after twenty-four hours, and the pressure removed from the outside of the nose after three or four days (Fig. 4).

Fig. 3 (Case A454026). Nasal hump.

Fig. 4 (Case A454026). Postoperative picture. The hump was rasped off through an incision inside the left nostril by specially shaped rasps.

Comment.—While there are various methods of removing bony nasal humps, the method of rasping them off through an incision inside the lateral wall of the nose is most satisfactory, as it eliminates entirely any external scarring. Infection has occurred in only one case; this was readily taken care of with hot dressings and did not interfere with the cosmetic result.

Case 3 (A118722). *Angioma of the nose and cheek.*—The patient was brought for examination November 7, 1914, for an angioma of the left side of the nose and cheek. It had been noticed at the age of two weeks. The child had had multiple operations, silk-worm sutures being used outside the cheek in an attempt to scar down the angioma. At the time of examination, there was an extensive angioma of the left cheek, bulging the left side of the nose and extending into the inner canthus. It was impossible to make out the complete outline of the nose. There was marked scarring over the tumor, the result of the repeated operations (Fig. 5). Radium treatment was advised, most of which was given by inserting radium directly into the tumor. A small incision was made into the normal tissue, either inside the mouth or outside the cheek, at some distance from the tumor, and then by means of a curved, small forceps, a channel was made into the center of the tumor, and a radium tube attached to a silk thread inserted directly into the tumor. These treatments were repeated no more often than every three months, the usual dosage being in a 25 mg. tube, left in place for from five to ten hours. September 16, 1919, a pedicle flap was brought down from the left temporal region to correct partially the ectropion of the lower lid, the angioma having been entirely destroyed by the radium (Fig. 6).

Fig. 5 (Case A118722). Cavernous angioma of the nose and cheek. Note the scarring over the surface from previous operations.

Case 4 (A218918). *Angioma of the nose.*—The child came to the Clinic January 11, 1918, because of an angioma of the tip of the nose, 2.5 cm. in diameter; she was perfectly well otherwise. The angioma affected the entire tip of the nose, causing marked deformity (Fig. 7). January 15, 1918, a 25 mg. tube of radium was inserted directly into the angioma through a small incision at the juncture of the nose and left cheek. The radium was left in place for twelve hours. No other treatment was given. Figure 8 shows the patient six years later, nothing further having been done for the condition.

Comment.—Radium is specific for cavernous angiomas. In 1917 I reported a group of cases illustrating this fact. Previous to this time, Abbe and others had used it in this type of condition with good results. In infants and young children the results are much more satisfactory than in

adults. The most satisfactory method of treatment is inserting a small radium tube directly into the center of the tumor through a small incision in the skin or mucous membrane, some distance from the tumor. This allows a valve-like action of the skin between the incision and the tumor, which prevents bleeding. The results in all of this group of cases have been very satisfactory.

Case 5 (A454995). *Full thickness graft replacing basal-cell epithelioma of nose.*—The patient came for examination February 11, 1924, with a lesion over the bridge of the nose, of five years' duration. Various types of treatment had failed to afford relief. There was a thickened lesion over the bridge of the nose about 5 by 3.75 cm. The skin was movable. The condition was a basal-cell epithelioma of rather a low grade type (Fig. 9). February 14, 1924, the lesion was widely excised and the skin replaced with skin from the back of the right side of the neck. Gauze pressure was applied for ten days and the entire area of the graft adhered, except for one small area over the bridge of the nose, apparently the result of too much pressure. This, however, epithelized quickly (Fig. 10).

Fig. 6 (Case A118722). The same patient five and one-half years later. Tumor was removed by means of repeated radium treatment. The scarring of the cheek is the result of previous operations.

Comment.—This case illustrates the value of full thickness grafts in replacing low grade, basal-cell epitheliomas. It should not be used in cases of active basal-cell epitheliomas if there is any likelihood of recurrence. It is much more satisfactory than the use of a pedicle flap, and saves the patient at least six weeks' time in the hospital. The graft being taken from the back of the neck is practically the same color as the rest of the skin about the nose, so that the cosmetic result is exceptionally good. Keller, Parce, Blair and others, have called attention to the value of such grafts.

Full thickness grafts are used on the face and neck wherever there is sufficient supporting tissue to allow of firm pressure after operation, as in corrections of ectropion of the lips, the excision of scars about the face, following the removal of an inactive basal-cell epithelioma where a plastic closure is impossible, in correcting the scarring of the chin and neck, and in grafting the distal end of pedicle flaps where a double epithelized flap is required. The graft is cut from the neck or leg, the same size as the area to be grafted. This is done by using a pattern. The grafts are used without fat, and sutured in place with dermal sutures. Gauze is applied evenly over the graft and firm pressure applied with adhesive plaster. The part is kept absolutely immobile for at least ten days, and the dressing is not removed before that time. It is best to use the grafts on fresh, clean wounds. The grafts may be made up to 7.5 cm. in diameter; I do not believe it advisable, as a rule, to use the grafts much larger than this on account of the difficulty of keeping them under even pressure. It is best to make repeated grafts rather than to at-

Fig. 7 (Case A218918). Cavernous angioma of the tip of the nose.

Fig. 8 (Case A218918). The same patient five years later, following one radium treatment.

Fig. 9 (Case A454995). Basal-cell epithelioma of the bridge of the nose.

Figs. 11 and 12 (Case A445324). Loss of part of the lower third of the nose following lupus, and the use of a plaster.

Fig. 10 (Case A454995). The postoperative result after excising the basal-cell epithelioma and replacing it with a full thickness graft from the neck.

Figs. 13 and 14 (Case A445324). Nose built up by means of a pedicle flap from the forehead with a full thickness graft on the distal end. Note the fact that the vestibules of the nostril are open, owing to the use of the full thickness graft.

tempt to use too large ones. It is not advisable to try them on the neck in very young children on account of the difficulty of keeping the part absolutely quiet for the required period. If it is attempted, it is best to keep the child in a Bradford frame, with lead shot bags on either side of the head to prevent movement. I believe that the essential points are: to cut the graft free from fat, to have the area to be grafted dry, to apply firm, even pressure over the graft, and to keep the part absolutely immobile, not disturbing the dressing for at least ten days.

Case 6 (A445324). *Loss of part of lower third of nose.*—The patient came to the Clinic October 23, 1923, for reconstruction of the nose, which had been destroyed by a plaster and by lupus. The lupus had started three years before, and she had had various types of treatment, including *x*-ray. She obtained a plaster from a peddler and applied it herself; this caused most of the deformity (Figs. 11 and 12). The patient was well otherwise. October 29, 1923, a pedicle flap with the pedicle just to the right of the median line of the forehead, and the flap extending up to the left forehead, was outlined and elevated, under local anesthesia, and a full thickness graft inserted underneath the distal end. About two weeks later, the full thickness graft having taken perfectly, the flap was elevated. Three days later, it was brought down in place over the nose, and after the margins had been freshened, and sutured in place

over what was left of the columella, was attached laterally to what remained of the ala. December 10, 1923, after a preliminary cutting off of the pedicle in stages, this cutting off was completed, the distal end of the flap sutured back in place on the forehead, and the flap over the nose sutured in place. The patient was then allowed to go home for three months as the nose appeared quite large. She returned March 8, 1924, and the superfluous part of the flap was trimmed down in three stages, to improve the appearance. Figures 13 and 14 show the patient April 4, 1924, shortly after removal of the sutures. Note the fact that the use of the full thickness graft underneath the distal end of the flap has maintained a good right nostril (Figs. 13 and 14).

Comment.—By far the most satisfactory place to secure a pedicle flap for reconstruction of part of the nose is from the forehead. Taking the flap from the cheek causes unnecessary scarring, and the color of the flap from the neck is not as satisfactory as that obtained from the forehead. In order to obtain an open nostril in these cases, the use of full thickness grafts underneath the distal end of the flap is very essential. The full thickness grafts are more satisfactory than the Thiersch grafts for this purpose. It is best to delay the final shaping up of the nose for at least three to six months after the flap has been sutured onto the nose, on account of the shrinkage that takes place.

An Anesthetic Monopoly.—U. S. patent 1,491,740 was issued April 22, 1924, and was assigned by the patentee to the S. S. White Dental Manufacturing Co. The specifications of the patent describe a process for making a nearly anhydrous nitrous oxid. The patentee claims patent rights, not only on his process for reducing the moisture-content and in nitrous oxid manufactured by that process, but on all nitrous oxid whatsoever conforming to the arbitrary standards stated in his claims, no matter how manufactured. The process, if novel, is presumably worthy of patent protection. But nitrous oxid has been recognized as a chemical entity since 1776, and it has long been possible to reduce by various processes the moisture-content incident to its manufacture. By what process of reasoning the patentee claims to have "invented" nitrous oxid of low moisture-content and how the patent office came to concede his claim, are beyond the comprehension of persons not versed in the mysteries of patent logic and patent law. It would not be to the public interest for any concern to obtain a monopoly on nitrous oxid free from moisture. It is to be hoped that the S. S. White Dental Manufacturing Company will not be able to secure a monopoly on dry nitrous oxid (Jour. A. M. A., July 26, 1924, p. 287).

THE CONDUCTION MECHANISM OF THE HEART*

OLGA S. HANSEN, B.S., M.D.

Minneapolis

The change observed in titles of papers on conditions of the heart and circulation in the last few years is most striking. Instead of being concerned with the purely structural changes of the muscle and valves of the heart and writing about valve lesions and their results in the pumping power of the heart, physiologists, anatomists and clinicians are thinking and investigating in terms of the origin and spread of the impulse that makes the heart act as a pump. The strides that have been made in overtaking the truths of the physiology and pathology of the heart-beat are enormous when it is noted that the condition of auricular fibrillation with which all clinicians are now familiar was first analyzed and explained by Lewis in 1909, and that the electro-cardiograph was first used by Einthoven in 1903.

In order to understand the conduction mechanism of the heart as it has been proved to exist, and to realize the relation of the different parts to each other, it is well to trace its development from its fetal beginning.

Early in embryonic life the large veins, called the Ducts of Cuvier, or common cardinal veins, bringing the blood from the head and the body, unite, and in uniting form the sinus reuniens, which in turn empties into the primitive one-chambered auricle. This sinus corresponds closely to the sinus venosus of the frog, which is a chamber into which the large veins empty and is separated from the auricle by the venous valves. Later, as the auricle is divided into two chambers and the heart grows in size, the sinus reuniens does not grow but is incorporated into the body of the right auricle at the point of junction with the superior vena cava. It is thought that the remains of this primitive tissue form the pacemaker of the mammalian heart. In harmony with this view is the fact that in the frog a ring of specialized tissue is found about the bases of the venous valves (between the sinus venosus and the auricle), and incomplete portions of such a ring are found in the higher animals at the points

*Read by invitation before the Consulting Medical Staffs of the Lymanhurst School for Tuberculous Children and the Parkview Sanitarium, November 27, 1923.

corresponding to the remains of these valves. In the frog the contraction of the heart originates in the sinus venosus, giving more force to this theory of origin of the pace-maker of the mammalian heart.

In the human and other mammalian hearts a small collection of peculiar muscular tissue, arranged in a complicated network bound together by connective tissue, is found at the junction of the superior vena cava with the right auricle and corresponds in location to the right branch of the embryonic veins. It is known as the sino-auricular node, or node of Keith and Flack, after the workers who described it. A second similar collection is found in the wall of the auricle at the base of the septum, in the neighborhood of the coronary sinus, and represents the left branch of the embryonic veins. This is known as the auriculo-ventricular node, or node of Tawara, and is the beginning of the connection between the auricle and ventricle.

From this auriculo-ventricular node a heavy band of specialized tissue known as the bundle of His, or the auriculo-ventricular bundle, passes down the ventricular septum and forks to the right and to the left ventricles. The fibres branch out into a complicated arborization which lines the ventricular cavities, and end in a network of Purkinje fibres, consisting of cells without striation and with large pale nuclei, lying just below the endocardium.

The bundles and fibres are covered with connective tissue sheaths, and the nodes in the auricle are richly supplied with blood-vessels and nerves.

In brief the conduction mechanism of the heart consists of remains of embryonic tissue collected in dense nodes held together by connective tissue, in the auricles, and of strands of specialized muscle fibres arranged in a parallel manner passing from auricle to ventricle and then branching out as a network into the ventricular muscle. It is thought that the primitive muscular tissue acted without nerves in the beginning but, as the nerves were supplied during fetal growth, they took over more and more control of the mechanism. The function of these collections of specialized tissue is to originate and transmit impulses, although it must be noted that any part of the heart muscle can perform these functions, with some degree of success.

The sino-auricular node, corresponding to the remains of the right embryonic vein, is known as the pace-maker of the heart. Each normal heartbeat originates here and travels through the auricular muscle as an excitation wave, causing contraction of this chamber. The rate at which these impulses are sent down depends on the influence of the vagus and accelerator nerves in modifying the intrinsic rate of the node. The impulse spreads through the auricular muscle at the rate of 1,000 millimeters per second, in a circular motion, which has been likened to the widening circles made when a stone strikes water.

It is then carried by the auriculo-ventricular node and bundle to the ventricles and from here the impulse spreads from within outward, by means of the Purkinje fibres, which carry the impulse at a rate of 5,000 millimeters per second, five times as fast as the rate of spread through the auricle and ten times as fast as the rate of conduction through the ventricular muscle if stimulation is applied to the pericardial surface, instead of to the endocardial surface where the Purkinje fibres are located. These fibres carry the impulse so rapidly that the contraction of the ventricle is practically simultaneous, whether in the thickest or the thinnest parts of the ventricle. It is of interest to note that the conduction rate is most rapid through the parts of the conduction system richly supplied with glycogen, that is the Purkinje fibres, and that the breadth of these fibres is greater than that of any others. The glycogen content is less in the auricle, the ventricle, and the auriculo-ventricular node, in the order named, and the breadth of fibre is correspondingly less. At the same time the rate of conduction is slower in the auricular muscle than in the Purkinje network; in the ventricular muscle than in the auricle; and there is evidence that the auriculo-ventricular node has the lowest conduction time of all.

The nerves affect the action of the heart through the nodes in the auricle. The right vagus influences the sino-auricular node. The sino-auricular node is the pace-maker and so stimulation of the right vagus slows the heart. The left vagus influences the auriculo-ventricular node. This node is the beginning of the junction between the auricle and the ventricle, and so stimulation of the left vagus causes blocking of conduction between the chambers. Actually fibres from the vagi are so mingled that the action is not quite so clear-cut as the embryonic origin might indicate. Experiment-

ally stimulation of the left vagus affects both nodes about equally although the right nerve seems to be more specific in its action. The accelerator nerves have the same distribution of effect. Many physiologists have found that stimulation of the right accelerator nerve causes an increase of rate, while when the left nerve is stimulated contractions occur simultaneously in the auricle and ventricle, because of the overaction of the auriculo-ventricular node. Again this can be traced back to the distribution of the right nerve to the embryonic region, corresponding to the right vein in the embryo, and of the left to the auriculo-ventricular node corresponding to the embryonic left duct of Cuvier. Experimental heart-block is then produced by a change in the conducting power of the main neuro-muscular tract uniting the auricle and ventricle, by injury, by disturbed innervation, or by poisons.

In summary, the cardiac contraction originates with an impulse from the pace-maker, the sino-auricular node, passing as an excitation wave through the bands of auricular muscle. Then it is carried through the junctional tissues, the auriculo-ventricular node, the bundle of His and its branches to its arborization in the interior of the ventricle. The Purkinje fibres beneath the endocardium transmit the impulse to the ventricular muscle, and so rapid is their rate of conduction that the spread through the ventricles is almost simultaneous, resulting in a contraction of the ventricle as a whole.

Once the contraction wave has passed and systole has occurred the heart muscle settles down to a diastolic period of refractoriness, and is then ready to respond to the next impulse which arises when sufficient contractile energy has been stored up. The vagus acts as the inhibitor and keeps the rate slow enough to bring about effective contractions. The balance between the vagus and the accelerator nerves maintains the rate best suited for the organism under all circumstances of rest and of exertion.

REFERENCES

Lewis, Thomas: The mechanism and graphic registration of the heart-beat. 1920.

Hirschfelder, A. D.: Diseases of the heart and aorta. 1918.

Eyster, J. A. E., and Meek, Walter J.: Studies on the origin and conduction of the cardiac impulse VIII. The permanent rhythm following destruction of the sino-auricular node. Am. Jour. Physiol., vol. 61, No. 1, pp. 117-129, 1922.

Eyster, J. A. E., and Meek, Walter J.: Studies on the origin and conduction of the cardiac impulse IX. Sino-ventricular conduction. Am. Jour. Physiol., vol. 61, No. 1, pp. 130-137, 1922.

THE RISING TIDE OF BUREAUCRACY

A direct and immediate consequence of the over-multiplication of regulatory and inquisitorial laws is a corresponding increase in the number of offices and office-holders.

It is a profound mystery why the people of the present generation should so violently run after the very things which their forefathers so violently ran away from in 1776.

One of the chief indictments of King George set forth in the Declaration of Independence reads:

"He has erected a multitude of new offices and sent hither swarms of officers to harass our people and eat out their substance."

Can we believe that the signers of that historic Declaration would have been so ready to pledge their "lives," their "fortunes" and their "sacred honor" to its defense if they could have foreseen that a later generation would voluntarily consent to the creation of bureaus and commissions and to the appointment of officers a hundred-fold greater in number than King George and the British Parliament ever thought of imposing upon the Thirteen Colonies?

A recent authority has estimated that within the period in which the population of the United States increased ten per cent the number of persons holding civil office increased forty per cent, that the amount paid in salaries increased one hundred and fifty per cent, and that of males old enough to hold a job one in every forty-seven is now in some kind of government employment.

The same authority estimates that of the total revenue collected by the U. S. Government, one dollar in every five is paid out in salaries, and that the total salary list of the Federal Government is now approximately equal to $10.00 for each and every man, woman and child of the entire population, without including the sums paid to the immense army of state and municipal employees. At the present rate of increase, two more decades will see one adult in every ten holding some kind of public office, and paid from taxes collected from the other nine.

The growth of bureaucracy, like the growth of every other governmental evil, has been insidious. Always it has been concealed under the cloak of *pro bono publico.* Always the movement is alleged to be in the interest of public health, public safety, public morals, or is designated by some other fine sounding title. Most of those who advocate and those who assent to the creation of new offices are animated by the best of motives. The road to bureaucracy, like the road to perdition, is abundantly paved with good intentions.—*From an address delivered at the 24th annual Convention of the National Association of Retail Druggists, Detroit, Sept. 26, 1922. Reprinted from the Midland Druggist and Pharmaceutical Review.*

THE CLASSIFICATION OF THE IRREGULARITIES OF THE HEART*

HARRY OERTING, M.D.

St. Paul

Irregularities of the heart are so frequent, and their presence is so readily detected, that it is necessary to differentiate the various forms and to know their significance. An irregularity may be of no importance or it may mean a grave heart condition, and unless the underlying cause is recognized the patient may either have a serious heart lesion overlooked or he may be unnecessarily worried and subjected to a regime that will prevent him from living an otherwise useful normal life.

In order to readily arrive at a diagnosis it is essential to have some method of classification. Several classifications have been suggested by various authors but it is not within the scope of this paper to consider all of them and I have arbitrarily chosen the classification as suggested by Lewis in 1911 as the most practical for the present purpose.

The various irregularities of the heart will be taken up under the following headings:

1. Sinus Arrhythmia.
2. Premature Contractions. (Beats of ectopic origin or extra-systoles.)
3. Paroxysmal Tachycardia.
4. Auricular Flutter.
5. Auricular Fibrillation.
6. Heart Block.
7. Alternation of the Pulse.

1. *Sinus Arrhythmia.* — Sinus arrhythmia is that almost universal and relatively unimportant acceleration and slowing of the heart rate that accompanies normal respiration, being most marked in young individuals. Sinus irregularities are produced by interference with the rythmic impulses at their origin and discharge. Normally the stimulus to contraction arises in the sino-auricular node, which lies in the upper anterior end of the sulcus terminalis. The sulcus terminalis runs from the junction of the right auricle and superior vena cava toward the inferior vena cava. This node consists of a specialized network of muscle cells and is richly supplied with the nerves of the heart. The contraction which starts in this node spreads through the walls of both auricles to the auriculo-ventricular node and is then transmitted by the auriculo-ventricular bundle of His to the ventricles. The normal heart rate averages about seventy-two beats per minute and is under control of the vagi or inhibitory nerves of the heart. Many times the vagi act with excessive inhibition either persistently or spasmodically and the result is a uniform slowing or an intermittent slowing.

2. *Premature Contractions.* — Premature contractions, or extra-systoles as they are better known, and which terms will be used interchangeably in this symposium, are the results of impulses arising from a new site which may be located in the auricles, ventricles, or conduction system. Normally the impulse begins at the sino-auricular node, travels down the auricles to the A-V node and then through the bundle of His and its branches and is distributed simultaneously to the musculature of both ventricles. In premature contractions, or extra-systoles, the impulses are named according to their point of origin, as auricular extra-systoles, ventricular extra-systoles, etc. Extra-systoles occur before the regular time and disturb the normal rythm of the heart, except in the interpolated forms. The contraction starts abruptly and travels quickly and in general does not tend to repeat itself. *Etiology:* This condition occurs in any cardiac disease where the walls of the heart are dilated or the heart is working against a high pressure; also in toxemic conditions due to digitalis, gastro-intestinal infections and the bacteria of the acute infectious diseases.

3. *Paroxysmal Tachycardia.*—Paroxysmal tachycardia is a condition of sudden acceleration of the heart rate. The abnormal focus is usually situated in the auricle and the normal sequence of contractions is maintained. A paroxysm may last a few beats and recur from time to time or it may last for hours or days. The attack begins and ceases abruptly. *Etiology:* Attacks occur at all ages and excitement or emotional disturbances are the chief excitants of an attack in those predisposed.

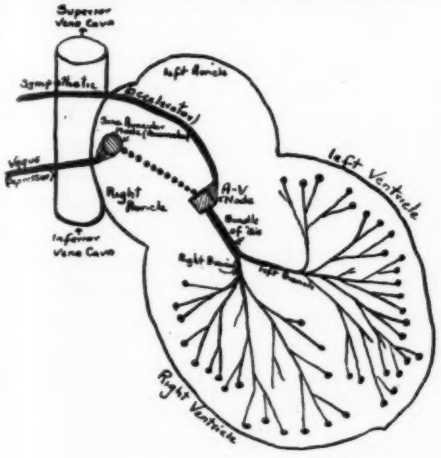
4. *Auricular Flutter.*—In auricular flutter the normal beats of the auricles are submerged by contractions of this chamber in response to a series of new impulses varying in rate from 200 to 350 per minute. "Our knowledge of clinical auricular flutter is too incomplete to permit of more than

*Presented before St. Paul Clinic Week, St. Paul, January, 1924.

speculation as to its exact nature. Reasons for believing that heterogenetic impulses stand to it in the relation of a causal factor have been adduced. It has to be borne steadily in mind that the condition is closely connected with fibrillation. It possesses a curious quality, namely, a tendency to persist in circumstances where the exciting cause appears to be no longer at work. In this it resembles fibrillation" (Lewis). Flutter is comparatively rare, is seen for the most part in the sixth and seventh decades of life and is always associated with heart block. *Etiology:* There is no apparent relation to the infectious diseases, but at times there is association with arteriosclerosis.

CONDUCTION SYSTEM OF HEART.
(Diagrammatic)

THE SINO-AURICULAR NODE(PACEMAKER) LOCATED IN THE RIGHT AURICLE AT THE JUNCTURE OF THE VENA CAVA, INITIATES EACH NORMAL IMPULSE TO CONTRACTION. FROM HERE THE IMPULSE SPREADS OVER BOTH AURICLES ARRIVING, BY THE SHORTEST ROUTE, AT THE AURICULO-VENTRICULAR NODE(BETWEEN AURICLES AND VENTRICLES). THIS IN TURN BECOMES ACTIVATED AND SENDS AN IMPULSE ON TO THE VENTRICLES THRU THE BUNDLE OF HIS. A BRANCH OF THIS BUNDLE GOES TO EACH VENTRICLE, AND SUB-DIVISIONS PROVIDE FOR THE SPREAD OF THE IMPULSE SIMULTANEOUSLY TO ALL PARTS OF BOTH VENTRICLES



5. *Auricular Fibrillation.*—Auricular fibrillation is a condition of total irregularity in rate, force and rythm of the heart, formerly referred to as delirium cordis or pulsus irregularis perpetuus, caused by stimuli from multiple foci in the auricles. There is no auricular systole, the auricles being in diastole and fibrillating. The ventricles react only to a portion of the stimuli starting down the conduction system. *Etiology:* There are two general classes of cases where this condition is noted, i e., in mitral stenosis and when myocardial damage has occured. Syphilis is not an etiological factor per se.

6. *Heart Block.*—In this condition there is a delay in or absence of response by the ventricle to impulses from the auricle. In the normal heart the auricular systole sends an impulse along the bundle of His to the ventricle. The bundle of His starts in the right auricle near the coronary sinus and proceeds forward and downward to the membranous septum of the ventricles, where it divides into two main branches, one on either side of the septum. The main branches then subdivide and are connected to the musculature of the ventricles through the complicated network of cells named after Purkinji. Whenever there is a disturbance of function in the bundle of His there is a disturbance in the normal beats of the heart. There may be a simple delay in the conduction time through the bundle of His. If the delay is prolonged sufficiently the ventricles fail to respond to some of the auricular impulses and we have the so-called dropped beats. The dropped beats produce a pause that breaks the normal rythm of the ventricle. As the degree of heart block increases the ventricular silences become more frequent and relatively simple ratios are established between the auricular and ventricular rates. With half the auricular impulses coming through we have a 2:1 heart block. This ratio may reach 4:1. In complete block no impulses from the auricles reach the ventricles, and each take up their own rate, which is 72 for the auricles and 33 for the ventricles. *Etiology:* This condition occurs at any age, predominating in males. It follows severe damage from rheumatic fever, chorea, and senile affections. The condition is not infrequent during the course of acute infectious disease. Syphilis is also one of the outstanding causes of heart block. The great bulk of the cases can be placed either in the rheumatic or the syphilitic group and in either case they are an expression of a deep seated and widespread affection of the heart muscle. In elderly people the condition often cannot be attributed to the above causes and is due to senile changes in the heart muscle itself. Block is also sometimes associated with metastatic car-

cinoma of the bundle of His. Digitalis is one of the prominent causes of heart block. Pathologically the main bundle of His or its branches or its auricular attachment are the seat of the lesion.

7. *Alternation of the Pulse.*—Alternation of the pulse is a condition in which the left ventricle while beating regularly expels larger and smaller quantities of blood. There is alternation of the pulse beats so that every other one is smaller or larger than the one just preceding. This condition is of obscure origin and the disturbance is dependent upon some unexplained anomaly of the ventricular systoles. The contractions of the ventricle are regular and each is preceded by a regular auricular contraction. *Etiology:* This condition is seen in two classes of patients: where the heart rate is unduly accelerated as in paroxysmal tachycardia, and in normal rates in elderly subjects. Males show a distinct preponderance. Pathologically there are no typical lesions. The condition has been noted in angina, hypertension, renal disease and fibrotic myocarditis.

"We must return to the basic idea that the granting of the degree of Doctor of Medicine means that a student is capable of handling the ordinary problems of general practice. This is certainly necessary before he can be safely trusted to advance in any special field. In the ordinary small community we find the general merchandise store. One can obtain here the essentials of human life in ordinary existence. If one wants any special appliance or something unusual it takes time to obtain delivery and one must either send or go to a larger field. This illustrates general practice and also the requirements for every medical man. In our larger centers we have the department store, where there is a marked extension of everything represented in a general merchandise store with experts in charge of each department. Medicine likewise is handled in this way where specialists in various lines are available. In the general merchandise store the proprietor knows everything that he has on hand and how to guide his customer to get promptly the essential things that he needs. In the general department store much is left to the customer himself. Without guidance he may over-purchase in a single department when his real needs lie in another. It is inevitable that there shall be these two forms of organization. One of the ways to protect the person who deals largely with specialists is to have the specialist understand thoroughly the essentials of general medical practice."—Extract from address by Dr. Ray Lyman Wilbur, President-elect of the A. M. A., at annual meeting of the California State Medical Society, May 16, 1922.

THE INSTRUMENTAL RECOGNITION OF CARDIAC IRREGULARITIES*

HAROLD E. RICHARDSON, M.D.
St. Paul

It has only been through the instruments of precision, the electro-cardiograph and the polygraph, that we have been able to determine the true nature and variety of the cardiac irregularities. We are all familiar with the terms "delirium cordis" and "extra-systole," which are remnants of our early clinical knowledge and which as the result of the use of these instruments are now more accurately recognized as "auricular fibrillation" and "premature contraction" respectively.

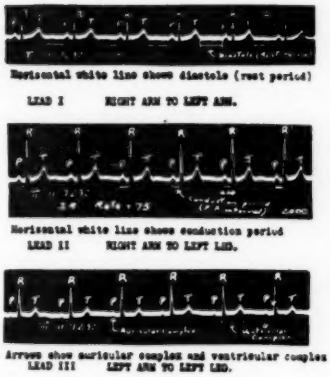
Because of its extreme delicacy and accuracy of definition, the electro-cardiograph stands in a class by itself in the study of the heart, particularly of the irregularities of this most vital organ. In this regard also, its co-partner, the polygraph, occupies a secondary, but very important, position, and is used by us to supplement the information obtained by the electro-cardiograph. The polygraph, being a portable and relatively simple instrument, readily lends itself to wide-spread clinical use.

THE ELECTROCARDIOGRAPH

Modern electrocardiography was made possible by (1) the discovery of Kölliker and Müller in 1885 of the fact that an electric current was generated by each beat of the frog's heart; (2) the observation of Ludwig and Waller in 1887 that similar currents generated by the human heart could be recorded by means of a capillary electrometer; and (3) the construction by Einthoven in 1903 of an extremely sensitive modification of Ader's instrument which made possible such experimental work as placed the electrocardiograph in the clinical field and justified the manufacture of commercial instruments.

Gradually a few instruments came into use in this country, and in 1912 Dr. Charles Lyman Greene, then head of the Department of Medicine at the University of Minnesota, secured the installation there of the first electrocardiograph in the North-

*This paper combines the essential points of two papers. The first, on "Practical Electrocardiography," was presented before the Ramsey County Medical Society, November, 1923; the second, on "The Instrumental Recognition of Cardiac Irregularities," was presented at the Ramsey County Medical Society Clinic Week Symposium on "Cardiac Irregularities," January, 1924.


Horizontal white line shows diastole (rest period)
LEAD I RIGHT ARM TO LEFT ARM.
Horizontal white line shows conduction period
LEAD II RIGHT ARM TO LEFT LEG.
Arrows show auricular complex and ventricular complex
LEAD III LEFT ARM TO LEFT LEG.

Normal Electrocardiograph

No arrhythmia. The "P" and "T" waves are all of good height and upright in all leads. The conduction time is 0.16 seconds (normal limits 0.12 to 0.18 sec.). No ventricular preponderance.

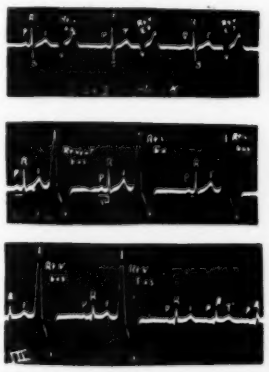
west. At present there are five in the Twin Cities available to all members of our profession.

The high initial cost (about four thousand dollars) together with the heavy expense of upkeep and operation, limits the number of purchasers of this instrument to the individuals or groups who have a sufficient demand for it. Fortunately neither possession of the instrument nor familiarity with its operation is necessary inasmuch as it is the completed, permanent, photographic record *alone* that is of importance to the physician, the actual process of registration revealing nothing.

Interpretation of an electrocardiographic record is a relatively simple matter. I shall demonstrate to you later that no atmosphere of mystery need envelop the instrument or its records. Their mysterious qualities disappear under the application of quite simple interpretative formulæ. One cannot doubt the great interest that has been aroused in the profession as a whole by the tremendous advances in the effective and timely diagnosis and treatment of heart disease by this indispensable instrument of precision, and it is only to be regretted that this interest has been curbed by the lack of a knowledge so easily obtainable.

I purposely omit a detailed description of the complicated, delicate instrument itself, as that would involve a departure from the direct purpose of this paper. With respect to the actual production of an electrocardiogram, one may say that it is a moving picture of the deflections of a microscopic filament, suspended between the poles of a powerful electro-magnet, said deflections being caused by the conduction of the electric currents accompanying and reflecting the phases of the heart cycle. To each end of the conducting filament, an electrode is connected, and between these two electrodes the patient is placed, completing the circuit. The "so-called" action currents can be *led* across different portions of the heart and off from the body, according to the placing of the electrodes, hence the term "lead," of which there are three in regular use, indicated always by the Roman numerals I, II, III. Lead I gives the electrical activity of the heart as viewed from the top, i.e., across the auricles, and to obtain it the electrodes are placed on the forearms. Lead II gives the electrical activity of the heart through its main diagonal and necessitates placing the electrodes on the right arm and left leg. Lead III gives the electrical activity of the left side of the heart, the electrodes being placed on the left arm and left leg. You will see the necessity and importance of these three leads in following with me the lantern slides which are now to be shown.

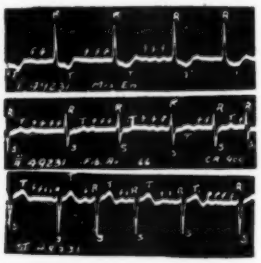
No one should be permitted to get the idea that an electrocardiogram represents a complete, ready-made diagnosis of a heart condition. The electrocardiograph, like the *x*-ray, is a vital necessity in all careful and accurate studies of the heart. While it, like the *x*-ray, is absolutely indispensable to a complete cardiac examination, it in no way displaces or lessens the value or necessity of the classical clinical methods, but is, rather, an adjunct to



Right Ventricular Extrasystoles

In this case they follow each normal heart cycle. Evidence of the normally occurring auricular contraction is wholly buried in the diphasic extrasystolic wave as is usually the case. The "regularity" of the "irregularity" as reflected in the pulse is very confusing.

them. The information it supplies is exact and precise, and while it may at times simply confirm and amplify the clinical conclusions, it goes much further, giving vital facts such as are impossible to obtain by any other means. It shows not only the



Misleading Type of Auricular Fibrillation (lacking delerium cordis)

The "P" wave is absent. Multiple coarse undulations (fibrillatory waves) fill the diastolic period. Note that the ventricular rate is only 66 and that the "R" waves occur almost rhythmically. Lacking an electrocardiogram, this type of fibrillation is often unrecognized clinically, or is interpreted as a mere Sinus Arrhythmia. Pulse likely to be termed "regular," but a curious hesitant quality is apparent to one familiar with this not uncommon type. Strikingly good compensation may be attained without abolition of the auricular fibrillation in such cases.

exact heart rate and rhythm, but *exactly defines* any arrhythmia present, reveals the existence of ventricular preponderance, asynchronism of the ventricles, auricular hypertrophy, auricular pathology, auricular fibrillation no matter how masked or obscure clinically, ventricular fibrillation, auricular flutter, paroxysmal tachycardia with its point of origin, and sometimes the presence of the "drop" type of heart and alternation. It also shows the presence of hypotonus of the heart muscle, suggests the presence of chronic myocarditis and hyperthyroidism, and offers certain aids in evaluating heart muscle strength. It gives its most valuable information in its revelation of the presence of: (1) delayed conduction; (2) heart block of the ordinary type whether partial or complete; (3) sino-auricular and branch-bundle block; (4) defects in the arborization fibers; and (5) over-digitalization. It helps greatly in prognosis. It often unmasks silent, insidious heart lesions of middle age, otherwise undetectable, by unveiling branch-bundle block, arborization defects, and certain specific "T" wave inversions indicative of a grave heart condition. Our routine use of the polygraph has long since demonstrated its great value, but both in scope and exactitude it is distinctly inferior to the electrocardiograph.

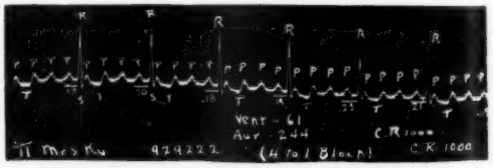
The electrocardiograph gives no direct information concerning the heart size, the valvular lesions, murmurs, the nature of heart tones, blood pressure, or decompensation. These are to be determined and evaluated by the other clinical methods. On the other hand, those conditions within the heart which are most obscure and least readily revealed by the usual diagnostic methods constitute the field par excellence of the electrocardiograph. Not only does this instrument give us a means of rounding out a diagnosis, but again and again it reveals the presence of a dangerous and wholly unsuspected heart lesion, unrecognizable by other methods of cardiac investigation.

In closing I would summarize as follows:

1. Interpretation of an electrocardiogram and a polygram is a relatively simple matter.
2. Both electrocardiogram and polygram are permanent records, giving within their scope most valuable and exact information concerning the heart's action.
3. Neither instrument furnishes a complete, ready-made diagnosis of a heart condition.
4. They do give vital information concerning the heart, of a sort that cannot be obtained by any other means.

It is obvious that both of these instruments make possible more accurate, scientific diagnosis, more intelligent prognosis, and more timely and effective treatment.

The writer wishes to express his grateful appreciation to Dr. Charles Lyman Greene for his careful criticism of this paper and his many helpful suggestions in its writing.



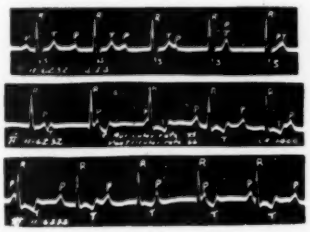
AURICULAR FLUTTER WITH FOUR TO ONE HEART-BLOCK

Auricular rate 244. Ventricular rate 61 (four "P" waves to each "R" wave), case of auricular fibrillation under Quinidine, passing to "flutter" (here shown), then to normal rhythm, and later relapsing into fibrillation.

THE POLYGRAPH

This instrument consists of a double clockwork device which drives a narrow strip of paper under

the recording pens at a uniform rate of speed and simultaneously records the time in fifths of a second. One writing pen records the radial pulsations, the other the pulsations of the jugular vein,



Complete Heart Block

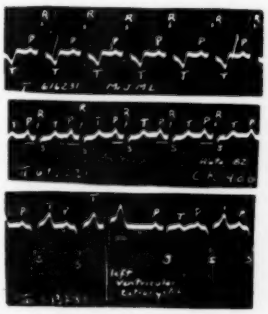
The auricles and ventricles are contracting regularly but entirely independently and at totally different rates. Note that the "P" wave, indicating auricular contraction, occurs at regular intervals and that the "R" and "T" waves, indicating ventricular activity, also occur regularly, but there is complete dissociation between them and the rate of the former is 75, while that of the latter is 66, an unusually rapid idio-ventricular rhythm. Usually the ventricular rate in complete block is 40 per minute or less.

Accurate diagnosis is possible only with instrumental methods of investigation.

as the record is usually taken. The normal tracing of the radial pulse consists of a series of single waves corresponding to the ventricular contractions. The normal jugular record is made up of a series of three chief waves for each radial pulsation, these waves being called the "a," "c" and "v" waves respectively. The "a" wave is produced by the systole of the right auricle; the "c" wave is due to the contraction of the ventricle, and the "v" wave reflects the distention of the large veins due to the accumulation of blood after the right auricle has become completely filled in diastole. The "v" wave is an evidence of stasis and is increased by all factors which tend to increase the amount of blood in the right auricle, such as high arterial tension, tricuspid regurgitation, etc. Variations from the normal in the character, time of occurrence and the sequence of the various waves readily defines any and all cardiac irregularities. Thus with an auricular premature contraction all waves of the normal cycle are present in their usual sequence, but all occur prematurely. With a premature contraction of ventricular origin, where the rhythm of the auricle is undisturbed, we find a premature and immature radial thrust, and in the corresponding jugular cycle the "c" wave precedes or occurs with the regularly occurring "a" wave. In a premature contraction of nodal origin where the impulse arises in the auriculo-ventricular node between the auricles and ventricles, these two chambers contract at the same time and there is found in the jugular record an exaggerated wave, representing a fusion of both the "a" and the "c" waves, corresponding in time to the premature beat in the radial record.

In complete block there is no relation between the "a" waves of auricular contraction and the "c" waves of ventricular contraction and as in this condition the auricles contract more often than the ventricles, there are many more "a" waves than "c" waves in the jugular record. With partial block, where the ventricles respond to every second, third, fourth or more auricular contractions, in the first case or two-to-one block there are two "a" waves to each "c" wave; in the second case or three-to-one block there are three "a" waves to each "c" wave; and so on. In sino-auricular block where there is simply a temporary arrest of the heart action, we find normal heart cycles preceding and following the unusually long period of diastolic rest.

In auricular flutter the "a" waves occur at the rate of two hundred or more per minute, corresponding to the excessive rate of contraction of the auricles, and as there is usually some degree of heart-block present, there are two, three, four or more "a" waves to each "c" wave. Paroxysmal



Right Branch Block

A grave condition which can be diagnosed accurately only by the electrocardiograph. Characterized by (1) exaggerated first and third leads; (2) notched and widened "R" and "S" waves; (3) the direction of the "T" waves in first and third leads, which is opposite in direction to that of the dominant wave of each.

The side through which the impulse passes is determined exactly as ventricular preponderance is determined. The block, therefore, must be in the opposite ventricle. (Third lead shows a left ventricular extrasystole.)

tachycardia in which there is characteristically a sudden outburst of rapid action of the whole heart with an abrupt ending, reveals itself in the polygram by these same features. The paroxysm begins and ends with a premature contraction, usually of auricular origin.

In auricular fibrillation the radial shows the total irregularity in rate, force and rhythm. The jugular record characteristically shows no definite "a" wave, but is completely over-run by coarse fibrillatory waves. The "c" waves, being due to ventricular contraction, also show a total lack of rhythm.

It should be said also, that in addition to its value in the accurate differentiation of the cardiac irregularities, the polygraph aids greatly in evaluating heart muscle strength, in showing the various grades of venous stasis, and in demonstrating variations in the conduction time of the heart. Again and again polygraphic findings are determining factors in the proper management of a heart case.

HOW TO CHOOSE A DOCTOR

Replying to an inquirer who wants to know how to be governed in the selection of a physician, Dr. Wm. A. Brady, in the *Chicago News*, gives the following pointers for the guidance of the layman in choosing his doctor:

First, the name of the good doctor is rarely seen in print.

Second, in making examinations he requires the patient to remove clothing which may interfere with the detection of signs and symptoms.

Third, when he is out of town he is attending a medical meeting or taking a brief postgraduate course.

Fourth, he asks frequently for consultations or refers patients to colleagues for special examinations, and when his patients die asks for autopsies, all because he never gets through studying medicine. This is why he buys so many books and subscribes to so many first class medical journals.

Fifth, he prescribes simple medicines to meet particular indications at the particular time, and not "ready-made" stuff with which he has recently been "sampled." Or, perhaps, he prescribes no medicine at all, but merely lays down some common-sense rules for the guidance of his patient.

Sixth, he never guarantees or promises a "cure," because to do so would be to be dishonest.

Seventh, he is invariably a stickler for the observance of the rules of ethics.

Eighth, being an honest laborer, he deems himself worthy of his hire and demands payment.

Ninth, he does not put a patient off with the evasion, "weak lungs," nor does he perpetrate the near diagnosis, "catarrh." He makes a definite diagnosis or frankly admits his inability to do so.

Tenth, "he will do anything short of murder for a loyal patient."

IRREGULAR ACTION OF THE HEART: ITS CLINICAL RECOGNITION*

CHARLES N. HENSEL, M.D.
St. Paul

Twenty-five years ago the chief interest in heart disease centered on valvular lesions and septic endocarditis. During the succeeding ten years the center of interest shifted to the heart muscle, and the capacity and integrity of the myocardium was stressed in all cases of heart disease. The last ten to fifteen years has witnessed an increase in our knowledge of the anatomical structure and physiological function of the heart. This knowledge has been manifest in a better understanding of the *conduction system* of the heart. By conduction system is meant that nervous mechanism lying within the heart itself which transmits contraction stimuli. It includes the sinus node in the wall of the right auricle where stimulus matter keeps accumulating and is discharged at regular intervals, causing contraction waves to spread over the auricles, as ripples spread from a pebble dropped into a still pool. These waves reach and stimulate a second node of nerve tissue, the auriculo-ventriculo (or A-V node), lying on the floor of the right auricle. Impulses from the A-V node travel to the bundle of His (lying in the interventricular septum), down the bundle of His to the right and left branches which go to the right and left ventricles, the branches ramifying into a fine network of nerve fibres to all parts of the ventricles, called the arborization fibres, and ending in sensitive bulbous ends called the Purkinje system.

The vagus nerves join the heart largely in the sinus region and act as a curb to stimulus formation and discharge, in the sinus node.

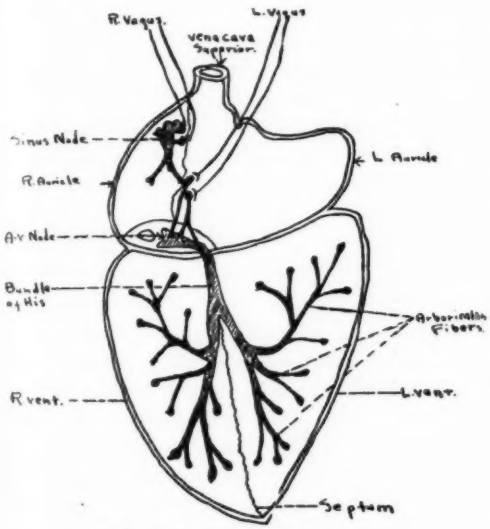
The normal cardiac cycle consists of a definite sequence of events, namely, stimulus production and discharge, auricular contraction, ventricular contraction, diastolic pause.

Systole requires three-tenths of a second while diastole occupies five-tenths of a second. During all of systole and the early part of diastole all the functions of the heart except tonicity are in abeyance, therefore the heart is in a refractory state and cannot respond to stimuli. But as diastole progresses these powers return and by the time

*Read in Symposium on Irregularities of the Heart at St. Paul Clinic Week, January, 1924.

sufficient stimulus matter has accumulated at the sinus node to cause another contraction, excitability, contractility and conductivity have been restored.

Regular action of the heart depends therefore upon the normal balance between stimulus production at the sinus node, and *excitability*, *conductivity* and *contractility* of the heart muscle. Depression or exaltation of one or more of these functions will interfere with the normal sequence of events in the cardiac cycle and thus produce irregular action of the heart.



Schematic Drawing of Heart Showing Conduction System.

It is evident therefore, from the foregoing remarks, that the conduction system ranks equally with the myocardium in interest and importance to the cardiologist. The wider use of the electrocardiograph is the means by which there has come a better understanding of the conduction system and has made possible a more accurate differentiation of abnormal rythms. The use of this instrument in the recent Great War with opportunity for the study of large groups of soldiers under constant supervision and control, has given a splendid correlation between instrumental and clinical findings. Subsequent observations in civil life have largely confirmed these observations, so that today in the majority of instances we are able to accurately differentiate *clinically* the various types of cardiac irregularities. This is particularly true of the commoner and more important types under discussion.

Sinus Arrhythmia.—This type of irregularity is frequently seen while making an examination of an excited child. There is a rythmic variation in heart rate, the heart speeding up with inspiration and slowing down with expiration. Probably unstable vagus control is responsible for this variable rate. Occasionally with the slow heart of convalescence following a severe illness we note this same rising and falling rate associated with respiration.

A rare form of sinus arrhythmia must be mentioned which occurs independent of respiration and in which there is a slowing and acceleration of the whole heart occupying ten to fifteen seconds and occurring at variable intervals. During the long pauses no abnormal heart sounds are heard. Anything which accelerates the heart (exercise, atropine, fever) abolishes this irregularity.

While sinus arrhythmia is found chiefly in childhood and adolescence it is also observed occasionally in adults of nervous or emotional temperament and is probably due to imbalance between sympathetic accelerative influences and vagus slowing influences. Sometimes it appears to be due to heavy indulgence in tobacco.

Extra-Systolic Irregularity.—Isolated extra-systoles are not difficult to recognize. The examining finger on the pulse detects a small beat occurring too soon in diastole, followed by a longer pause than usual. On listening to the heart with the stethoscope one hears three to four sounds, namely, the first and second sounds of the normal beat plus the sounds produced by the extra beat. If the extra-systole has not sufficient force to open the aortic and pulmonic valves then only three sounds are heard.

Patients may be unconscious of the occasional extra beat but frequently when extra beats become numerous they cause distress and anxiety, particularly in young, nervous, high strung individuals. These people experience a fluttering of the heart associated with momentary dizziness, and a sensation as though the heart had turned over and then stopped sometimes associated with precordial pain. During the diastolic pause they complain of a weird sensation of emptiness in the chest. If the extra-systoles are numerous and occur at short intervals the patients may feel ill and depressed.

Extra-systolic irregularity when marked may

have to be differentiated from auricular fibrillation and to do this a few short rules will suffice.

1. In extra-systolic irregularity there are always periods of normal rhythm.

2. The total heart rate is rarely above 120 beats per minute. An irregular rate greater than this is suggestive of fibrillation.

3. Exercise causes extra-systoles to disappear or to be greatly reduced in number.

4. In auricular fibrillation exercise increases the irregularity and causes the rate to rise.

Patients who are susceptible to marked extra-systolic irregularity occasionally experience times when the extra-systoles are not relieved or reduced by exercise, but instead the rate seems to rise, the heart to slam violently and a sensation of weakness and exhaustion supervene. This history is suggestive and if the patient is examined at this time he will, in all probability, be found suffering from an attack of transient auricular fibrillation.

Paroxysmal Auricular Tachycardia.—This consists of bursts of rapid regular action of the whole heart of sudden onset and sudden offset, due to an abnormal focus of impulse formation arising somewhere in the auricle outside the sinus-node. During the attack the new center dominates the movements of the whole heart, the influence of the pace-maker being temporarily lost. The heart at this time is but slightly under vagus control and such factors as emotion, exertion, rest or sleep, which materially affect the normal heart rate, do not modify the rate during an attack. Attacks may last seconds, minutes, hours, days, and may occur at varying periods for many years, the heart, during the free interval, in most cases showing no abnormalities. The rate during an attack may be anywhere between 110 and 200 per minute, the usual levels running between 140 and 190 per minute. Often paroxysmal tachycardia must be differentiated from the high rates in such affections as goiter, alcoholism and tuberculosis, but the presence of these diseases can be ascertained and the reaction of the heart to posture, exercise, and rest observed in differentiation.

Summary of Clinical Recognition.—If we find a patient in an attack of palpitation with (1) a history of previous attacks of palpitation of sudden onset and sudden offset; (2) with a heart rate of about 180 per minute and regular; (3) the rate unaffected by held breath, swallowing, change of position, rest or exercise; (4) the rate unaffected or suddenly terminated by vagal pressure; and (5) the minute count constant from minute to minute, then in all probability we have a case of paroxysmal tachycardia. The minute count is obtained by counting the heart rate with the stethoscope over the apex for a full minute and repeating in five to ten minutes. In paroxysmal auricular tachycardia the minute count should not vary more than one or two beats, one beat where the second hand crosses the line at the start and one beat on the last second of the minute.

In borderland hyperthyroid states we sometimes observe attacks of palpitation of sudden onset but the offset is gradual, the rates dropping from around 160 beats per minute to 130 beats per minute to 120 beats per minute and thus resuming the patient's usual rythm. In true paroxysmal auricular tachycardia the rate jumps abruptly between two beats to 180 or 190 or whatever the rate may be, stays at that rate for the duration of the attack and as suddenly between two beats resumes the usual rythm.

Auricular Flutter.—This irregularity has been defined as that condition in which the auricles, due to new impulse formation outside the sinus node, are beating regularly at rates, varying in different cases, from 200 to 350 beats per minute. Flutter bears some resemblance to paroxysmal auricular tachycardia, but whereas in tachycardia each auricular contraction is followed by a ventricular contraction, in the high rates of flutter it is impossible for the ventricles to respond to all the auricular impulses so that some degree of block occurs, usually a 2 to 1 ratio obtaining, which means that two auricular beats occur to each beat of the ventricles. This degree of block is not always constant, but may vary from 2 to 1, to 3 to 1, or even 4 to 1 block. At times these ratios change from one rythm to another, giving the heart an irregular action which might cause the condition to be confused with auricular fibrillation. However, this need not cause much trouble since in flutter there are always periods of regular rythm, which rarely obtains in fibrillation.

Usually when flutter is first seen and especially should the attack come on in a paroxysm, the degree of block is a 2 to 1 ratio.

Certain fundamental points should be in mind when considering the possible presence of flutter,

namely, that while auricular tachycardia is relatively common and may occur all through life, flutter is a rare disturbance occurring in the middle and later years of life and is associated with signs of serious myocardial damage.

These patients with flutter usually give a history of previous attacks of palpitation of sudden onset for months or years, the present attack persisting. Examination reveals a regular ventricular rate between 130 and 160 beats per minute, which rate is unchanged by posture, rest, or exercise; is temporarily slowed by vagal pressure, but never stopped. The minute count is surprisingly constant from minute to minute.

Should there be any irregularity of the ventricular rate due to changing ratios of block, then a little exercise, namely, raising arm or leg from the bed, accelerates the ventricular action, induces perfect regularity of ventricular response (2 to 1 block) and then differentiation can readily be made. Should there still be any doubt clinically as to the presence of flutter then the total apex count is helpful.

Rates at the apex of 180 beats per minute or above must be auricular tachycardia, for to be flutter the auricles would have to be beating at least twice the counted rate or 360 beats per minute. This is so rare as to be negligible, the upper limits of auricular rate being as previously stated 350 beats per minute.

Finally, the termination of flutter is never sudden as in auricular tachycardia, but the condition is relieved by flutter merging into fibrillation and so back to the usual rythm.

Auricular Fibrillation.—This is perhaps the commonest and most important of all the types of cardiac irregularity. It is marked by a disturbance in three of the fundamental functions of the conduction system, namely, impulse formation, irritability and conductivity.

The sinus-node, where normally stimulus matter regularly accumulates and is regularly discharged causing regular auricular contractions, has lost control, and from multiple areas over the auricular surface come rapid and minute twitchings and undulatory movements, but no definite systole of the auricle occurs, the auricles staying in diastolic standstill. These fibrillary twitchings of the auricular walls give rise to new pathologic impulses for contraction, similar to those shown to cause single premature beats in extra-systolic irregularity. These numerous and haphazard impulses reach the A-V node, causing a profound disturbance in ventricular rythm. The ventricular rate rises and contractions follow each other in a completely irregular manner. There occur short runs of small beats followed by large or small beats or by long or short pauses. This total lack of any dominant rythm reminds one of the uneven gyrations of a freshly landed fish on the bottom of a boat.

The rate of ventricular response to these new stimuli depends on the soundness of the myocardium and the integrity of the conduction system. While the ventricles may, by excessive impulses, be stimulated up to 200 beats per minute, the usual rates in fibrillation, due to myocardial damage and conduction defects, lie between 90 and 140 beats per minute.

Many of the ventricular contractions have not sufficient force to open the aortic valves, so that these beats do not come through at the wrist, thereby producing a pulse deficit, namely, a difference in the number of beats counted over the apex of the heart with the stethoscope and the pulse rate at the wrist, the discrepancy often being 20 to 50 beats. For example, the rate at the apex might be 140 beats per minute while the rate at the wrist would total only 90 beats per minute.

While a pulse deficit does occur on other rapid rythms, it is one of the suggestive differential points in auricular fibrillation. Due to the lack of auricular systole the ventricles are not completely filled, and this inadequate filling is further aggravated by the irregular diastolic pauses. Thus the systolic output of the heart is reduced and the flow and pressure in the coronary arteries is lessened, which latter further increases the myocardial debility.

The Murmur.—With fibrillation the presystolic rumble of mitral stenosis (the usual murmur) disappears, to be replaced by a long, low-pitched murmer beginning after the second sound. Because of the continual variation in the force of the heart there is variation in the intensity of the murmur, the murmer sometimes being absent because some of the beats are too weak to produce a murmur. While fibrillation, when once established, was formerly considered a permanent condition, now we have abundant clinical and instrumental proof that fibrillation may be of transitory nature, attacks

often coming on in a paroxysm, lasting a short time, followed by return to normal rythm.

To summarize, the differential diagnosis is based on the following points:

1. A grossly irregular heart rythm.
2. A heart rate moderately elevated from 90 to 140 beats per minute.
3. The presence of a pulse deficit is helpful but not pathognomonic.
4. The minute count varies at least three to five beats or even more per minute.
5. Vagal pressure slows the rate temporarily, but never stops fibrillation.
6. Change of posture accelerates the rate.

From the above points therefore it is generally not difficult clinically to differentiate fibrillation from auricular flutter and auricular tachycardia except where the heart rate is slow, namely, around 100 to 120 beats per minute. At these rates it may be confused with extra-systolic irregularity.

To differentiate these two we have only to remember that extra-systolic rates rarely rise above 120 beats per minute, that exercise reduces or abolishes extra-systoles, while it increases the irregularity and raises the rate in auricular fibrillation.

Before leaving this type of irregularity I wish to call attention to the association of fibrillation with goiter. This may be an accidental occurrence, since the fibrillation may have existed before goiter symptoms developed. But not infrequently fibrillation seems to develop as a result of the toxic action of the goiter and exists either as a continual state or occurring in transitory attacks preceding or following operation.

If the myocardium is healthy, relief of the goiter causes relief of the fibrillation in many instances.

Heart Block.—In this disturbance the conduction system is at fault. Impulses for contraction continue to be regularly formed as usual at the sinus-node and regularly discharged at the normal rate. But after reaching the A-V node some or all of these impulses fail to be carried across the bridge of nervous tissue connecting auricles and ventricles, and there results *dropped beats*, *partial block*, or *complete block*, as the case may be.

The *dropped beat* is the first sign of incomplete conduction. When in a pulse previously regular there is a long pause and one finds on listening to the heart that there is no sound nor movement during this pause (as occurs in extra-systole), nor any association with respiration as occurs in sinus arrhythmia, then the pause is probably due to a dropped beat from a failure of ventricular response.

As the degree of block increases, more and more beats fail to get across to the ventricle till finally the ventricle responds to only one-half the auricular beats and a 2 to 1 block is present. This is the usual type of partial block; while ratios of 3 to 1 and 4 to 1 do occur, they are uncommon. Suspect a 2 to 1 block when the ventricle beats regularly at rates between 40 and 50 beats per minute. If there is a sudden halving of the usual ventricular rate, suspect 2 to 1 block.

Complete Block.—In this condition *no* impulses get across to the ventricles and a complete dissociation occurs between auricles and ventricles. The auricles may beat as usual about 72 per minute, while the ventricle builds up a slow, regular, independent rythm of its own at a rate of about 30 to 33 beats per minute. While not audible at normal rythms sometimes the systole of the auricles can be heard during the long pauses of block as faint, muffled sounds. Also additional evidence of the contracting auricles can be seen by observing the regular rapid pulsations in the vessels of the neck.

Where heart block has become established some degree of ventricular hypertrophy is obligatory in order to obtain complete ventricular emptying. The diastolic blood pressure usually is low, due to the squeezing of the blood from the arteries into the veins during the long diastolic pauses. The systolic blood pressure is likely to be elevated to 160 to 200 mm. if the heart muscle is reasonably healthy to permit this adjustment.

Adams-Stokes' Syndrome.—In mild grades of block there often occurs giddiness, fainting or momentary loss of consciousness. These symptoms apparently may be caused by periods of temporary marked slowing of the ventricular rate, which may be reduced to a total of 20 beats per minute or even to 8 beats per minute. At times there may be single prolonged periods of from 3 to 15 seconds duration in which no ventricular systoles occur.

When either of the above conditions occurs, un-

consciousness supravenes, the patient's face and neck become livid, breathing becomes stertorous while twitching of the muscles of the face and upper limbs occur; but the tongue is not bitten nor urine voided. The above attack is called Adams-Stokes' syndrome. In apparent epileptic seizures with a ventricular rate constantly at about 30 beats per minute, one should always suspect heart block and Adams-Stokes' syndrome rather than epilepsy.

Alternation of Pulse.—This type of irregularity, characterized by a pulse regular in rate but uneven in force, and indicative of a myocardium overstressed nearly to the limit, is in the majority of instances impossible of recognition except by instrumental means. Rarely can the finger, palpating the pulse, detect the unevenness of alternate beats. If, however, the blood pressure cuff be applied and the radial pulse carefully palpated as the pressure in the armlet is increased, an alternation in the force of the beats, which was not appreciated before, becomes obvious as the smaller beats drop out and only the larger beats which are able to send an impulse to the wrist are detected.

There are no subjective sensations in this condition except those referable to the disease in which alternation occurs, namely, angina pectoris, senile hearts especially when associated with hypertension, and in some severe acute septic processes such as pericarditis and pneumonia.

In conclusion I wish to state that this endeavor at *clinical* recognition is in no sense an effort or desire to supplant such valuable aids as the electrocardiograph and polygraph, but disturbances of cardiac rythm are often emergencies and sometimes serious, requiring immediate treatment when instruments may not be available.

Therefore, since, as has been shown above, the *clinical* recognition of many disturbances of cardiac rythm is possible in the majority of instances, we should be prepared to differentiate these irregularities at the bedside or the operating table, leaving till later their exact verification.

Finally, I wish to acknowledge my indebtedness to the works of Doctors Thomas Lewis and John Hay, and to the writings of Doctors Samuel Levine, H. A. Willius and B. E. Hamilton, in the preparation of this paper.

TREATMENT OF THE CARDIAC ARRHYTHMIAS*

ERNEST T. F. RICHARDS, M.D.
Miller Hospital Clinic
St. Paul

We have seen from the preceding papers in this symposium that the frequently encountered irregularities of the heart-beat can be sharply defined and clearly recognized one from the other if all the agencies at our command are called upon in their investigation. As some of the arrhythmias are of the gravest significance and tax our therapeutic efforts to the utmost, while others are of little moment and do not require any special management, obviously, in the treatment of an irregular heart strict classification and correct interpretation are of the most fundamental importance. When these have been determined, the management of an arrhythmia is based on fairly well defined principles of treatment, the essentials of which only, of course, can be discussed here.

SINUS ARRHYTHMIA

This simple disturbance of rhythm need not detain us in a therapeutic discussion except to point out that its chief practical importance lies in its recognition in order that it may not be confused with one of the important irregularities. Depending on vagal tone, increased by deep breathing, and abolished by exercise, this type of arrhythmia obviously calls for no treatment. Unfortunately, though, it is not always correctly interpreted, and it is by no means uncommon to see children and young adults seriously cautioned against overdoing because of an "irregularity," when the rhythmical disturbance present is merely a heightened physiological response in a perfectly healthy heart.

EXTRA-SYSTOLES

Although frequently toxic or neurotic, the true cause of premature beats may often be in doubt, and the possibility of a damaged myocardium must always be kept in mind. For example, tobacco may in a given case be the exciting factor, but careful observation over a long period, together with electrocardiographic studies, may be necessary in order to determine whether the myocardial irritability is merely temporary and of little significance, or, on the other hand, is a permanent dis-

*Presented in symposium at St. Paul Clinic Week, St. Paul, January, 1924.

ability indicative of grave cardiac impairment. Again, the age factor, together with the incidence of acute infections and other intoxications, should always be given considerable emphasis in weighing the importance of extra-systoles.

Extra-systoles may, therefore, be of minor significance, requiring only the removal of the exciting cause, or, on the contrary, they may represent a seriously crippled heart. Thus, the premature beat of the student undergoing his final examination requires only reassurance and the completion of the ordeal; whereas, extra-systoles in the arteriosclerotic man of affairs demand an easing of the load on an impaired myocardium, a strict curtailment of the patient's responsibilities and activities, a régime of properly balanced rest, diet and exercise, and the eradication of all possible foci of infection.

Drugs play little or no part in the management of extra-systoles, but occasionally mild sedatives, such as the bromides, by inducing more relaxation and rest, are of distinct value. Quinine and quinidin, through their depressing effect on the myocardium, may abolish a troublesome premature beat which intrudes itself unpleasantly on the patient's consciousness, but we must not allow these agents to lull us into a false security, nor postpone a searching analysis of probable causes and of the true state of the myocardium. It is hardly necessary to add that a heart exhibiting extra-systoles should not have its irritability increased by the administration of digitalis unless, of course, its use is necessitated by a failing compensation.

In spite of the occasional presence of serious myocardial damage, as in elderly individuals and in those carrying a hypertension, our attitude toward this common type of arrhythmia may well be a decidedly optimistic one, as fortunately the great majority of hearts showing extra-systoles are structurally intact. One so frequently sees men in their prime condemned to a constant worry, either from being told by their physician that the heart is irregular, or from being conscious themselves of the irregularity, when reassurance and removal of the cause are all that are necessary to abolish the extra-systoles. Let me illustrate by citing one of numerous similar examples: An important business man of fifty, who showed numerous extra-systoles during a period of great mental strain with attendant loss of sleep and heavy smoking, was refused life insurance. Fear of sudden death from heart disease added to his troubles, and incidentally to his extra-systoles. A short trip abroad returned him thoroughly rested and absolutely free from the arrhythmia. Now over a period of four years his heart has maintained a perfectly normal rhythm, he has been accepted as an excellent risk by the insurance companies, and he is pursuing a life of great activity in which physical exercise and relaxation share their proper proportion with the day's work.

PAROXYSMAL TACHYCARDIA

There is unfortunately no uniform treatment for this remarkable phenomenon. A slight paroxysm may terminate suddenly following some simple procedure such as tipping the patient up, or some other abrupt change in posture. Induction of vomiting, friction of the chest wall, or pressure on the vagus, may likewise terminate an attack. As, however, rapid cessation is an outstanding feature of this disorder, cause and effect are often in doubt.

Severe, prolonged paroxysms may resist all efforts and tax our resources to the utmost. Hypodermics of morphine, strophanthin intravenously, digitalis by mouth in full doses, quinidin sulphate intravenously, and chloral by rectum, are amongst the many procedures resorted to, but from the very nature of the disturbance one must always anticipate that results from any of these measures will be uncertain.

The experience of different observers varies widely in the results obtained by treatment in paroxysmal tachycardia. Digitalis usually has no appreciable effect, but Bernstein has reported a paroxysm of fourteen and a half days' duration which responded to full digitalization after resisting all other forms of therapy. Price believes that strophanthin, 1/100 grain intravenously, is the most useful remedy. Quinine has a strong advocate in Wenkebach, but in two recent cases in which we gave it in large doses during the paroxysms there was no effect. My personal observation has been that hypodermics of morphine, together with, if necessary, chloral by rectum, offer the most relief, probably by placing the patient in the most favorable condition for a termination of the paroxysm.

Paroxysmal tachycardia is compatible with long life. Death during an attack is infrequent, although it may occur if the duration of the paroxysm is greatly prolonged. Unfortunately, we

have no means by which we may correctly forecast the frequency of recurrences. There may be only one attack or, on the other hand, there may be several paroxysms in the course of twenty-four hours. It is, as a rule, a recurring disturbance but the intervals between paroxysms are extremely variable.

Between attacks diligent search should be made for possible exciting causes. Any existing gastro-intestinal disorder should especially receive attention.

AURICULAR FIBRILLATION AND FLUTTER

Both of these conditions require full digitalization. In fibrillation, digitalis must be pushed to a point where the excessive impulses coming through the auriculo-ventricular bundle are sufficiently blocked to enable the ventricles to rest. In flutter, full digitalization is sought in the hope of converting the rapid, regular auricular rate into fibrillation and thence to a normal rhythm.

The brilliant results obtained in auricular fibrillation by digitalis have given to this drug its unequaled pre-eminence in the therapy of cardiac disorders. If enough of it is given to saturate the fibrillating heart, digitalis blocks auriculo-ventricular conduction and secures adequate rest for the ventricles. Similarly, in auricular flutter if digitalis is administered in amounts sufficient to profoundly depress conduction, thereby increasing the heart block, fibrillation of the auricles may follow and may be succeeded by a normal rhythm.

In securing adequate digitalis dosage a great advance has been made by Eggleston, Robinson and others, by using the body weight as a guide, but Withering's original directions are still true that "it should be given until it either acts on the kidneys, the stomach, the pulse, or the bowels." Eggleston has suggested 0.15 gm. of the leaf, equivalent to 1.5 c.c. of the tincture, for every ten pounds of body weight. Thus, by this method a man weighing 150 pounds would require 22.5 c.c. of the tincture for full digitalization. The experience of many, however, is that 0.1 gm. of the leaf, equivalent to 1 c.c. of the tincture, is sufficient for every ten pounds of body weight. Thus, in the 150 pound man, where rapid digitalization is required, as in auricular fibrillation, my usual practice is to administer a total of 15 c.c., given as follows: one-half of the total amount at the first dose, one-fourth after six hours, one-eighth in six more hours, and the remaining one-eighth at the end of another six hours. The method is perfectly safe, as after the initial dose, succeeding doses may at once be discontinued if saturation is shown by a marked reduction in ventricular rate, or by the electro-cardiogram, or by toxic symptoms or coupled beats.

It is, I have found, more true of digitalis than of almost any other drug that the great mistake made in its administration is in giving it in too small and therefore ineffective doses. The great value of large and sufficient dosage is that complete saturation of a fibrillating heart can be obtained within a few hours, thus securing adequate rest for the ventricles. Furthermore, after saturation has been reached it must be maintained. The rate of excretion of digitalis in the adult amounts to 0.1 to 0.2 gm. of the leaf daily, the equivalent of 1 to 2 c.c. or 15 to 30 minims of the tincture. Therefore, it is necessary to administer at least this amount every day in order to maintain saturation when once it has been properly secured. Too much emphasis cannot be laid on this point, as by this means a fibrillating, badly crippled heart may carry on with a fair degree of efficiency for years.

Not since its introduction by Withering over 100 years ago has any drug been found which can surpass, or even approach, digitalis in the treatment of auricular fibrillation. Great interest, however, has recently been taken in the possibilities which quinidin sulphate possesses of bringing about a return to normal sino-auricular rhythm in some cases of auricular fibrillation. Almost a thousand cases of auricular fibrillation treated with quinidin sulphate have been placed on record since Frey, in 1918, advocated its use and recommended it in preference to quinine, which had been introduced into the therapy of auricular fibrillation by Wenkebach in 1914. While some observers are most enthusiastic over the results obtained, others issue serious warnings against the use of quinidin. When Lewis and his co-workers in 1921 showed that quinidin lengthens the refractory period of the heart muscle and slows conduction time, MacKenzie pointed out that the danger from the drug would lie in emboli following sudden restoration of sino-auricular rhythm. The report by Orr of embolic infarction of the brain occurring when normal rhythm was restored in a case of flutter, and several other cases now on record of embol-

ism following the administration of quinidin, have emphasized the importance of MacKenzie's warning. In spite of this possible danger, the majority of observers are agreed that in selected cases of fibrillation the employment of quinidin is justifiable in an attempt to bring about a restoration of normal rhythm. Its indiscriminate use is most certainly to be deplored, and especially in cases of long-standing fibrillation, or in fibrillation associated with decompensation, I feel most strongly that we are not justified in taking the risk of a possible fatal embolus through its administration. On the other hand, in fibrillation of recent origin, preferably of less than six months' duration, and in paroxysmal fibrillation, provided that the cases are kept under strict observation, I believe we have in quinidin a drug of unquestionable value. Numerous reports attest its merits. Thus, in twenty cases of auricular fibrillation reported by Clark-Kennedy, seventeen returned to a normal rhythm under quinidin. In Hay's fifteen cases, fibrillation was arrested in seven. Hewlett and Sweeney secured a return to normal rhythm in four out of eleven cases. In Hamburger's eighteen cases a normal rhythm was established by quinidin in eleven. These and similar reports show that normal rhythm has been restored by quinidin in 50 per cent or more of the cases in which it has been used. Such encouraging results, therefore, have in a selected case to be carefully weighed in the light of the known untoward results which have occasionally followed the employment of this drug.

When, after careful consideration, a case has been selected for quinidin therapy it is always advisable to test the individual reaction to the drug by first giving two doses of 3 grains each, from two to four hours apart. If these test doses have been well tolerated, from 15 to 30 grains a day, in divided doses, may then be administered until the rhythm becomes regular or until toxic symptoms appear. My experience has been that in the successful cases response to the quinidin usually occurs early, and that if by the fifth day a normal rhythm has not been established it is advisable to discontinue the drug. When a normal rhythm has been secured it may remain regular without the further administration of quinidin, other cases will require daily doses of 3 to 6 grains to hold the rhythm regular, while still others return to fibrillation in spite of the continuance of the drug.

Finally, in the management of these serious arrhythmias, general measures, such as rest in bed, regulation of diet and restriction of fluid intake, are now procedures of such recognized value that they no longer need be emphasized.

HEART BLOCK

As arteriosclerosis plays such an important part in the production of bundle lesions, the treatment of most cases of auriculo-ventricular, branch, and intra-ventricular block is chiefly a question of rest and the enforcement of all protective measures which will relieve the crippled heart and arteries of unnecessary strain. Where, however, the existence of syphilis can be established, or in any case where there is the slightest chance of syphilis being a factor in the block, vigorous inunctions of mercury with large doses of the iodides should be pushed to the limit of tolerance. Under these measures a block may be abolished by the clearing up of a gumma or syphilitic infiltration in the bundle. Unfortunately, however, the outcome from such treatment is by no means certain and many cases which we have every reason to believe are due to syphilis fail to respond to even the most active treatment. Neosalvarsan in the syphilitic heart should, I feel, always be used with caution. Chief dependence should rest upon mercury and the iodides, but in a favorable case a small test dose of neosalvarsan may be administered and if unattended by any ill-effect may then be followed at intervals by other small doses. In cases of partial auriculo-ventricular block, especially where digitalis is suspected as a factor, atropin, by releasing the tonic action of the vagus, may be of decided value.

PULSUS ALTERNANS

The temporary alternation in the volume of the pulse occasionally seen in rapidly beating hearts, as in paroxysmal tachycardia and auricular flutter, is usually of slight significance. When, however, the contractile power of the ventricles has been so exhausted by myocardial degeneration that a persistent pulsus alternans is the result, the outlook is extremely grave and our chief concern must be to protect and relieve the heart in every way possible. Rest is the main essential in treatment. By lessening the exhaustion of the heart and relieving it from all strain, rest may sometimes restore a considerable degree of contractility even to a badly degenerated myocardium. Therefore, all measures to secure this end, including the free use of sedatives, must be sought.

In conclusion, let me emphasize again that a correct interpretation of its cause and signficance constitutes the main platform upon which the treatment of an irregular heart is to be built; and that, although in some of the cardiac arrhythmias our therapeutic efforts are limited, there are others in which active measures of treatment, if carried out with sufficient thoroughness, lead to extremely satisfactory and even brilliant results.

REFERENCES

Bernstein: Jour. Am. Med. Assn., Vol. 78, No. 20.
Price: New York Med. Jour., Vol. 115, No. 4.
Frey: Berl. Klin. Wchnschr., 1918.
Lewis: Brit. Med. Jour., 1921, ii, 511.
Orr: Brit. Med. Jour., 1921, ii, 576.
Clark-Kennedy: Quart. Jour. Med., Vol. 15, p. 279.
Hay: Quart. Jour. Med., Vol. 15, p. 313.
Hewlett and Sweeney: Jour. Am. Med. Assn., Vol. 77, No. 23.
Hamburger: Jour. Am. Med. Assn., Vol. 77, No. 23.

EPSOM SALT PROTECTS AGAINST MOTHS

Epsom salt sprinkled in trunks, cupboards and other closed spaces is a great protection against moths, cockroaches and vermin and is considered preferable to the commonly used naphthalene by Dr. Paul Mitchell, Australian quarantine officer, whose recent investigations are told to us in the September *Hygeia*, popular health magazine (Chicago).

Dr. Mitchell noticed that on opening passengers' baggage for fumigation magnesium sulphate (Epsom salt) was sometimes used by travelers for the prevention of vermin. He determined to test its value as contrasted with naphthalene in the linen cupboards of the quarantine station, which was considerably troubled by the presence of moths, cockroaches, silver fish and a species of ant.

The cupboards were carefully cleaned out, the linen replaced and magnesium sulphate crystals scattered over the linen and shelves in one block, while naphthalene was used in another block. Weekly observations were made. At the end of three months traces of vermin were found in the cupboards where naphthalene was used, while those sprinkled with Epsom salt were free and the crystals of the salt as crisp as ever.

The difference in favor of magnesium sulphate was more noticeable at the end of five months, and by the end of a year the cupboards were still quite free from vermin, although the magnesium sulphate had deteriorated slightly, about a third of the crystals having turned to powder. These observations were confirmed by other trials. When tried in the open wards of the hospital, however, on mattresses, for example, the magnesium sulphate was found to deteriorate to a powder.

Dr. Mitchell concludes that Epsom salt is of far greater efficiency than naphthalene for the protection of linen and other fabrics against moths, cockroaches, silver fish, etc., but that on account of its rapid deterioration in the open it can only be employed in closed spaces.

STIGMAS OF LATE CONGENITAL SYPHILIS

PAUL A. O'LEARY, M.D.,
Section on Dermatology and Syphilology, Mayo Clinic,
Rochester, Minnesota

My remarks will be limited to the characteristic changes in the structure of the body, which, when taken alone, warrant a diagnosis of syphilis, or should arouse suspicion leading to a diagnosis, irrespective of serology or history. Lawrence, in a statistical summary of the congenitally syphilitic children seen in New York State (exclusive of New York City) has called attention to the frequency with which these stigmas are overlooked, and confirmed the impression that the majority of the diagnoses are made because of the suspicion aroused by a history of parental infection or by the positive Wassermann report on parent or child.

The signs and symptoms which will be enumerated are those seen particularly in the child or adult who has passed through the early stages of syphilis acquired in utero, and who has managed to survive the acute phase of the infection. Such children may have had the "snuffles," or they may have had active cutaneous syphilis shortly after birth; but due either to their resistance or the low virulence of the invading organism, they have managed to survive this period, and may have reached puberty or adolescence before noting any serious effects from the infection. Many of these signs and symptoms are not manifested until later in life, when some accident, such as severe trauma, or a complication, such as pregnancy, or a superimposed infection, such as influenza, typhoid fever, pneumonia, or the exanthemas, lights up the latent syphilis. Fournier found that the average age at which the first subjective symptoms of late congenital syphilis appeared was twelve years, the ages ranging from three to twenty-eight years.

A discussion as to the mode of infection will be omitted, also as to whether the infection is paternal or maternal, whether the syphilis is acquired in the birth canal, and whether the spirochete itself, or some period in the life cycle of the spirochete, is the cause of the latency. It should be emphasized that in this series of cases 30 per cent of the patients had negative reactions prior to receiving treatment, and 60 per cent became Wassermann negative under treatment. More than half of the 30 per cent

showed clinical evidence of active syphilis in spite of the negative Wassermann reaction.

THE HUTCHINSON'S TRIAD

Perhaps the best known evidence of inherited syphilis is in the so-called Hutchinson's triad, the symptoms being eighth nerve deafness, interstitial keratitis, and Hutchinson's teeth. This triad was described by Hutchinson in 1863, and the symptoms are definitely pathognomonic. In various reports it is estimated that only 8 per cent of congenitally syphilitic children have the three manifestations, although a combination of either two, or one alone is often seen.

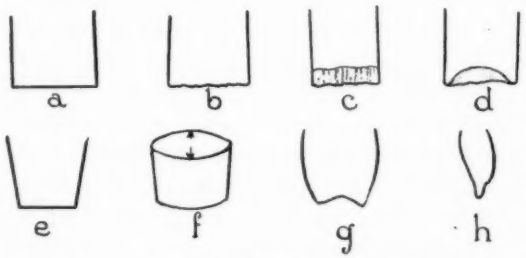


Fig. 1. a—Normal tooth, b, c, d—non-syphilitic serrations and notchings, e—Hutchinsonian incisor, converging edges (screw-driver shape), f—the Hutchinsonian incisor is a truncated cone, g—Typical Hutchinsonian tooth, pegged and notched, h—sagittal section showing anteroposterior thickening and notching.

Eighth nerve deafness.—Gradually increasing deafness in a young patient who has no local disease of the ear should arouse a suspicion of syphilis. The eighth nerve is one of the first to show clinical evidence of a syphilitic involvement, and it should be borne in mind that not only is the nerve itself the site of the reaction process, but that more frequently the appearance of the deafness means an active neurosyphilis with secondary eighth nerve involvement. The meninges are involved first, then the eighth nerve, and finally the labyrinth. Eighth nerve deafness may also be secondary to periostitis of the auditory osseus system. The number of congenitally syphilitic children examined who are deaf, varies, according to different observers, from 5 to 30 per cent. The deafness may appear early in life or not until maturity or puberty; it usually begins at the age of fourteen years, although cases have been reported at the age of forty-four years.

The onset may be gradual, with associated tinnitus, dizziness, and vertigo. Some consider a lowered bone conduction with a loss of the high tones of diagnostic value, although Goeckerman and Barlow have shown that its value is questionable because 49 per cent of non-syphilitic patients examined had a definite reduction. If deafness develops late in life, labyrinthitis is commonly associated. Eighth nerve deafness may be the only involvement manifested in a family of congenitally syphilitic children.

The prognosis as the result of treatment is not very favorable unless treatment is started while the process is acute. Occasionally, in disease of this type the advance will be arrested and result in impaired hearing rather than in total deafness.

Interstitial or parenchymatous keratitis.—Interstitial or parenchymatous keratitis, which is seen in from 20 to 30 per cent of syphilitic children, is also an associated condition in from 2 to 10 per cent of patients with acquired syphilis. Zimmermann noted that interstitial keratitis was a symptom in 33 per cent of white male children, in 61 per cent of white female children, in 35 per cent of colored male children, and in 75 per cent of colored female children, with congenital syphilis,

Fig. 2. Typical Hutchinsonian upper central incisors.

although other reports vary from 6.5 to 96 per cent. Greene observed that nineteen of 100 patients had evidence of past interstitial keratitis. That girls

are more likely to have keratitis has been pointed out by several authors, and de Schweinitz mentioned the association of the onset of keratitis with menstruation. The onset, usually between the fifth and fifteenth year, is insidious, with ciliary congestion, photophobia, lachrymation, pain, and the appearance of a cloudy patch within the center of the cornea. Iritis, choroiditis, and retinitis may be associated. The two latter conditions are similar to those associated with acquired syphilis. Blood vessels derived from the ciliary vessels appear in the layers of the cornea, and produce the dull red color, or so-called salmon patch of Hutchinson. The presence of the minute straight blood vessels in the corneal scar, and the deposits in the retina and choroid after the acute process has subsided, may be a means of recognizing the inherited syphilis as the etiologic factor.

Fig. 3. Pseudo Hutchinsonian teeth. Examples of notching (traumatic) in a congenital syphilitic whose teeth are not of the true Hutchinsonian type.

The appearance of interstitial keratitis should be a warning that eighth nerve deafness may occur if vigorous antisyphilitic treatment is not given. The differential diagnoses of syphilitic interstitial keratitis and other types are based largely on the recognition of the associated stigmas and other clinical evidence.

Optic neuritis, optic atrophy, and extra-ocular paralysis are seen in association with congenital neurosyphilis, and present a picture similar to that

Fig. 4. Mulberry molar.

seen in acquired syphilis. Solomon quotes various statistics to show that between 0.4 and 0.63 per cent of all patients between the ages of eight and fifteen years with diseases of the eye have interstitial keratitis. Bilateral dacryocystitis may often be attributable to congenital syphilis.

Hutchinson's teeth.—These are one of the most valuable single diagnostic signs. The changes noted are in the permanent teeth only. According to various statistics, between 10 and 48 per cent of syphilitic children have one or more such teeth. The typical Hutchinson's tooth is peg or "screwdriver" shaped (Fig. 1, e), it is thickened anteroposteriorly (Fig. 1, f and h), is notched or grooved (Fig. 1, g), and the teeth are widely spaced. These characteristics are named in the order of their importance. The pointed tooth is not diagnostic unless among the upper central incisors (Fig. 2). The anteroposterior thickening is demonstrated in (Fig. 1, f and h). The grooving or notching is by no means as valuable a diagnostic aid as either of the two characteristics just described, but unfor-

tunately is the one so diligently searched for by those seeking to make a diagnosis of congenital syphilis. The most common change in the cutting surface of the tooth is the upward arching or grooving, the degree being dependent on the degree of pegging and anteroposterior thickening (Fig. 1, g). In other words, the more narrow the tooth, the more acute the arch or the grooving. The serrations and grooving noted in Figure 3 and Figure 1, b, c, d, may be seen in children who do not have syphilis, as well as in the congenitally syphilitic child. The spacing between the upper and lower central incisors is an additional diagnostic aid when associated with the other three characteristics. Single Hutchinsonian teeth are not uncommon, and may be of material aid in the diagnosis. Alpasia of the teeth, and particularly absence of the incisor teeth, should arouse suspicion. Stokes and Gardner have called attention to the value of *x*-ray examination of the teeth of children in whom the eruption of the permanent incisors is delayed. They demonstrated the unerupted Hutchinsonian tooth in a child who had been under antisyphilitic treatment for four years before the *x*-ray examination was made.

Various other abnormalities in the incisors are seen occasionally, such as dwarfed or pointed lateral incisors, and loss of enamel on the lower third of the tooth, but these have no diagnostic value unless found in association with other clinical signs of the disease.

Besides the characteristic changes in the upper central incisors, sixth year molars may show similar changes. Attention was called to these teeth in 1870 by Moon, of England, and recently by Wall, of this country. The cutting surface of the tooth is worn, pitted and excavated. In this country it is called the mulberry or honey-combed molar, and is as common as the Hutchinsonian incisor (Fig. 4). An extra cusp, or the tubercle of Carabelli, on the inner side of the sixth year molars has been emphasized repeatedly by Sabouraud. In our experience it has been found not only in syphilitic children, but also in many normal healthy persons.

CUTANEOUS AND OTHER MANIFESTATIONS

The solitary gumma and the nodular syphiloderm.—The most common cutaneous manifestation of late congenital syphilis is the solitary gumma, and the typical nodular or tubercular syphiloderm, noted so often in patients with acquired syphilis, may be seen occasionally in the congenitally syphilitic patient. The cutaneous gumma is usually the result of the extension of any underlying syphilitic process to the skin, but may be a solitary cutaneous involvement. The nodular syphiloderm with its characteristic, indurated, arciform border, and a tendency to peripheral extension, residual pigmentation, and atrophic scarring, is identical with the late syphiloderm of acquired syphilis. The so-called copper colored spots, supposedly the residue of an active syphilid, are of little diagnostic aid because, as a rule, such spots are not a result of syphilis.

Fig. 5. Classical facies of lues hereditaria tarda.

Scarring.—The scarring noted at the mucocutaneous junctures, known as rhagades, are valuable adjuncts. They are to be found most often about the mouth, eye, anus, and nares. The "spoke-like" character of the scarring is one of its salient points.

Lesions of the mucous membrane.—The lesions of the mucous membrane are of two types: the acute infectious mucous patch, and the late nodular gummatous ulceration. The former is seen in

the very young patient; the latter may be noted at any period of the disease. Syphilitic leukoplakia is rarely seen in these patients.

Visceral involvement.—The visceral involvement does not differ essentially from that of acquired syphilis, except in its insidious onset and slow progression. Hepatic syphilis, with which 14 per cent of our patients were affected, is the most common visceral complication, and cardiac syphilis among the rarest.

Facies.—Not all congenitally syphilitic children present the classical textbook facies characteristic of congenital syphilis, but when they exist, they are usually recognized at sight. In fact, there is an erroneous tendency to attribute to syphilis all conditions that cause a "saddle-back nose," the paramount change in the congenital syphilitic facies. The characteristics of the pronounced facies seen in Figure 5 are due to the destruction of the septum, the prominence of the frontal bosses, the high forehead or so-called Websterian dome. The prominence of the lips and peg-shaped head are also contributory. When the nasal septum is intact there may be either no deformity or only a slight depression of the nasal bridge. In this type the forehead and prominent frontal bosses are sufficient to stimulate one to search further for other stigmas.

Lesions of the bones.—The lesions of the bones in congenital syphilis are valuable aids in its diagnosis. The most common lesions noted are saber-shin, periostitis, osteochondritis (epiphysitis), dactylitis, osteitis, and lesions of the joints.

The so-called saber-shin, or the anterior bowing and lateral thickening of the tibia, is a valuable sign (Fig. 6). The underlying process, which may be either a bone blister or a subperiosteal gumma that has become calcified, is, as a rule, symptomless, although occasionally an acute process may light up with symptoms of pain, particularly at night, swelling, heat, and marked tenderness. The distinction between the anterior bowed tibia of syphilis and the lateral bowed leg of rachitis must be borne in mind. The former is associated with definite lateral thickening of the tibia besides other evidence of syphilis, while the latter is associated with lesions of the tibia and fibula, and clinical evidence of rickets.

Congenital syphilitic periostitis, when acute, presents essentially the same findings as acquired syphilitic periostitis: pain, tenderness, swelling, and nocturnal pain, but in the chronic type, thickening and bowing are the only signs, the roughening of the anterior edges of this tibia not having much diagnostic value.

Fig. 6. Saber tibia.

Osteochondritis or epiphyseal enlargement is a common complication. When it occurs in the wrist it is the cause of ulnar deviation or the spreading of the fingers to the ulnar side when fully extended. Enlargement of the elbow and knee-joints may be noted also.

Dactylitis, the fusiform swelling of the shaft of the phalanges, may be noted in syphilitic and tuberculous children. The pathologic process, according to the *x*-ray, may be either osteitis or osteomyelitis. Syphilitic dactylitis is usually single, most often involving the index finger, while tuberculous dactylitis is invariably multiple.

Osteitis and osteomyelitis, with or without associated periostitis, present no particular characteristics, and other stigmas of the disease must often be sought before the causative factor can be determined.

Hydroarthritis, or glutton's joints,[4, 5] is a painless bilater hydrops due to inflammation of the synovial membrane, involving as a rule only the knee-joints. The von Gies joint, or osteoarthritis, is a progressive multiple chondritis occasionally encountered in the syphilitic child.

Graves called attention to the scaphoid or winged scapula, in which there is a convex curvature of

the vertebral side of the angle. Syphilitic Pott's disease has also been observed not infrequently.

Lesions of the nervous system.—The nervous system is involved in much the same way as in acquired syphilis. The more common forms of neurosyphilis are epilepsy, tabes dorsalis, paresis, taboparesis, paraplegia, diplegia, hydrocephalus, and cerebrospinal sclerosis. Parker, in a report of seven cases of juvenile tabes, noted that the clinical findings were quite similar to those recorded in cases of the acquired type of neurosyphilis, differing, however, in the insidious onset and latent course of the disease, the frequency of incontinence, and optic atrophy. He observed that ataxia, girdle pains and lightning pains were very rare.

In this group of late congenitally syphilitic children only 14 per cent had definitely positive spinal fluid findings, whereas Jeans has reported 32.7 per cent, and Kingery 28.8 per cent. The difference may be attributable to the fact that in my series, the borderline or questionably positive spinal fluid findings were not regarded as positive. The average age of onset of clinical symptoms of congenital neurosyphilis is about fifteen years. Hydrocephalus, paraplegia, and diplegia due to syphilis are rare. Mental retardation and idiocy are often met with as complications. Higgins reports that 42 per cent of mentally defective children had positive Wassermann reactions, and Jeans found that twelve of twenty-five neurosyphilitic children were mentally defective. In spite of these figures we frequently see the congenitally syphilitic child who is decidedly precocious and above his age average mentality. Hypertrichosis in the brunette, and the "syphilitic mop" are contributory findings. Leontiasis ossei, chronic peritonitis, intestinal bands and kinks, pulmonary lesions, nephritis, both acute and chronic, Raynaud's syndrome, Banti's disease, and aleukemic lymphadenosis have all been reported by various writers as attributable to congenital syphilis.

CONCLUSIONS

1. The classical stigmas of congenital syphilis are described, Hutchinson's triad being the most prominent.

2. Statistics are given as to the frequency with which certain of the stigmas are found. However, any deduction drawn from the percentages given would be misleading because it is not uncommon to find but one diagnostic stigma in a congenitally syphilitic child.

3. The serologic findings in this group have been particularly emphasized in order to impress on the reader the fact that, if only the Wassermann test of the blood is depended on for the diagnosis, only 70 per cent of the cases of late congenital syphilis will be correctly diagnosed.

4. Neurosyphilis was revealed in only 14 per cent of the children examined serologically, in contrast to 32.7 and 28.8 per cent as reported in the literature.

5. Attention is called to the need of corroborative, aids, such as examinations of the eye and ear, *x*-ray examinations, and serologic tests in certain of these patients.

BIBLIOGRAPHY

1. Fournier: La syphilis héréditaire tardive. Paris, Masson, 1896.
2. Gies, T. V.: Histologische und experimentelle Studien über Gelenkkrankheiten. 1. Gelenksyphilis. Deutsch. Ztschr. f. Chir., 1881, xv, 589-610.
3. Goeckerman, W. H., Barlow, R. A., and Stokes, J. H.: The diagnostic value of lowered bone conduction in syphilis. Am. Jour. Syphilis, 1919, iii, 240-247.
4. Hazen, H. H.: Glutton's joints. Lancet, 1886.
5. Hazen, H. H.: Syphilis. St. Louis, Mosby, 1919, 647 pp.
6. Higgins, W. H.: Relation of congenital syphilis to mental deficiency. Am. Jour. Med. Sc., 1918, clv, 549-553.
7. Jeans, J. C.: Cerebrospinal involvement in hereditary syphilis. Am. Jour. Dis. Child., 1919, xviii, 173-178.
8. Kingery, L. B.: A study of the spinal fluid in fifty-two cases of congenital syphilis. Jour. Am. Med. Assn., 1921, lxxvi, 12-13.
9. Lawrence, J. S.: Congenital syphilis: a public health problem. Jour. Am. Med. Assn., 1924, lxxxii, 1252-1254.
10. Parker, H. L.: Juvenile tabes. Review of the literature and review of seven cases. Neurol. and Psychiat., 1921, v, 121-130.
11. Sabouraud, R.: Hereditary syphilis and dentition. Med. Press and Circular, 1921, n. s. cxi, 192.
12. Solomon, H. C., and Solomon, M. H.: Syphilis of the innocent. Washington, U. S. Interdepartmental Social Hygiene Board, 1922, 239 pp.
13. Stokes, J. H., and Gardner, B. S.: The demonstration of unerupted Hutchinson's teeth by the roentgen ray. Jour. Am. Med. Assn., 1923, lxxx, 28-29.
14. Wall, J. S.: The significance of certain dental stigmata of congenital syphilis. Arch. Pediat., 1917, xxxiv, 765-770.
15. Zimmermann, E. L.: A comparative study of syphilis in whites and negroes. Arch. Dermat. and Syph., 1921, iv, 75-88.

INTRAPERITONEAL TRANSFUSION WITH CITRATED BLOOD: A FURTHER CLINICAL STUDY*

DAVID M. SIPERSTEIN, M.A., M.D.
With the technical assistance of
Miss Anna L. Kvenberg
Minneapolis

INTRODUCTION

The therapeutic benefits to be derived from blood transfusions are well recognized. The introduction of sodium citrate solution, with the consequent development of our present-day technique, has made transfusion a fairly common and relatively simple procedure. Until recently the importance of blood transfusions in infancy has not been fully appreciated. The introduction of the sinus route by Helmholz in this country, opened a new field in pediatric therapeutics.

However, an important period of life, during which the anterior fontanelle is closed and direct exposure of a vein difficult or impossible, was overlooked. Furthermore, while sinus puncture to the trained and well equipped man is a relatively simple procedure, it is not without inherent dangers. Many men have pointed out the difficulties frequently encountered, due to anatomical variations, to previous trauma, or to technical considerations of the moment. Under these conditions, and especially during the first period of childhood, a method of transfusing blood became essential.

Direct intravenous transfusion is obviously impractical, except through the jugular vein. The introduction of blood through the jugular vein is, however, limited in its scope to a comparatively few men of sufficient experience and training. Individual aptitude for any special technical procedure cannot apply to the profession at large.

The only other route that affords any possibility of success is the intraperitoneal one.

REVIEW OF PREVIOUS DATA

a. Animal Experimentation.

Since the work of Von Recklinghausen, in 1862, numerous investigators have shown that the peritoneal cavity of animals is capable of marked absorptive powers. All of the work was done with whole blood or defibrinated blood. Ponfick, in 1875; Poncet, in 1879; Arloing and Tripier, in 1880; Hayem, in 1884; Wm. Hunter, in 1887; Southgate, in 1897; Lesage, in 1900; Buxton and Torrey, in 1906; and Zimmerman in 1921,† are among the outstanding observers who have carried on investigations in this field. These men showed, through various more or less ingenious methods, that blood is absorbed from the abdominal cavity.

In a previous communication, Siperstein and Sansby[2] have shown the value of using citrated blood. From a study of a fairly extensive, controlled series of experiments, we were able to show that freshly citrated blood is absorbed very rapidly from the peritoneal cavity of rabbits. We concluded from our study on animals that the intraperitoneal route for blood transfusions was a justifiable procedure, safe in application, practical in results, and deserved a clinical trial.

b. Clinical Experimentation.

As far as we have been able to determine, Ponfick, in 1875, was the first one to inject defibrinated blood into patients. His results were apparently favorable. Burresi, Golgi and Raggi, Scottini, Giovanni, Liegl, and others, used this method, about the same time, without striking effect. The intraperitoneal injection of defibrinated blood then fell into disuse.

Our own studies, however, with citrated blood encouraged us to attempt its clinical application. Complete data and results obtained have been published elsewhere[3]. It may be stated, in brief, that we felt justified, from the therapeutic effects obtained, in continuing this procedure in other cases.

MATERIAL AND METHODS

It is our purpose in this paper to discuss intraperitoneal blood injections in general and to present other clinical cases. Furthermore, we are able to report several cases showing the limitations of this method.

Our clinical diagnoses in the cases to be presented are:

Case 5. Secondary anemia. Hemolytic anemia.
Case 6. Purpura hemorrhagica.
Case 7. Athrepsia.
Case 8. Streptococcic meningitis.
Case 9. Pyloric stenosis.
Case 10. Prematurity. Lues.

A routine method of procedure is followed. The recipients' and donors' bloods are grouped before

*From the Department of Pediatrics, University of Minnesota. Read before the Consulting Medical Staff of the Lymanhurst School for Tuberculous Children, Jan. 23, 1923.

†A complete review of available literature was given in a former paper.

every transfusion. The usual precautions regarding the donors' blood are always taken.

On the morning of the transfusion the patient is not given any breakfast. Freshly prepared 2 per cent citrate solution is used in the customary proportion of 10 c.c. of citrate solution to 100 c.c. of blood. The donor's blood, kept at body temperature and strained through gauze, is *immediately* injected into the peritoneal cavity of the patient. The abdominal puncture is performed in the usual manner.

It is necessary to emphasize only two points in the entire procedure. The citrate solution must be fresh and the donor's blood must be injected immediately.

For forty-eight hours following each transfusion all specimens of urine and feces are tested for blood. Benzidine and guaiac tests are used. In addition, the temperature of the patient is taken every two hours until the reaction, if any, has subsided (Figs. I and II). Hemoglobin estimations, red blood cell counts and blood smears are in some instances taken every hour on the day of transfusion, then at least once daily during the subsequent stay in the hospital. Unless otherwise stated, all hemoglobin determinations are made with the Fleischl-Miescher hemoglobinometer. All the blood counts are made by the same person, ruling out individual variations in technique.

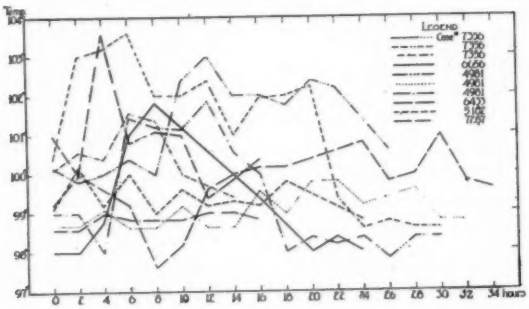


Fig. 1. Graphic presentation showing temperature reactions following intraperitoneal transfusions.

CASE REPORTS

Case 5. (H7356)—Secondary Anemia (?) Hemolytic anemia. Patient, five months old, admitted to the hospital Dec. 11, 1922, complaining of pallor, listlessness and poor appetite. When two weeks old, the baby suddenly "turned yellow" and commenced to vomit. A doctor was called, who found a marked secondary anemia (hemoglobin 20 per cent; red blood cells 1,472,000). The baby was given whole blood subcutaneously several times without marked effect. The sinus route was then resorted to with better result. A third attempt at sinus transfusion was unsuccessful. Direct exposure of a vein in the arm was also unsuccessful. The baby was then given citrated blood intraperitoneally a number of times with apparent success. The transfusions were discontinued when the hemoglobin reached 59 per cent.* Two weeks after the last transfusion, the hemoglobin began to fall. Medical advice was not requested until December 9, 1922. At that time, the hemoglobin was 28 per cent.

Physical examination showed a well developed, well nourished infant, apathetic, irritable, with a marked pallor and slightly yellow tinge to skin. The spleen was palpable 6 cm. below the costal margin.

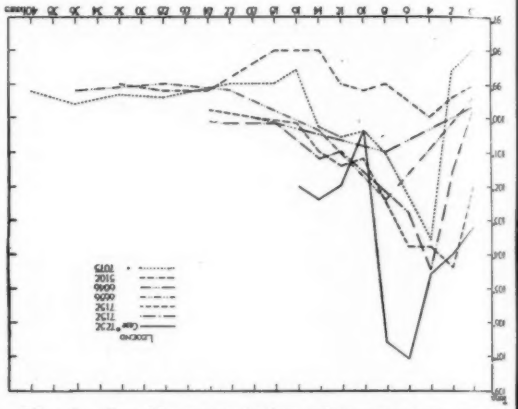


Fig. 2. Graphic presentation of temperature reactions following intravenous transfusions.

Laboratory Data on Entrance.—The urine examination was negative and there was no urobilin or urobilinogen present. The stools were repeatedly negative for blood. The blood picture showed a hemoglobin of 35 per cent (Von Fleischl-Meischer); red blood cells 1,300,000; white blood cells 31,200 with a differential count of polymorphonuclears, 24 per cent; lymphocytes, 88 per cent; transitionals, 6 per cent; and eosinophiles, 2 per cent. The Wassermann reaction was negative. The parent's blood test was also negative. The bleeding and clotting time was within normal limits. The fragility test was normal. The patient was in Group IV. Morphological examination showed deeply stained red cells; marked anisocytosis, many nucleated erythrocytes; polychromatophilia—evidence of active bone marrow stimulation.

Subsequent Notes.—Dec. 11, 1922. Intraperitoneal transfusion with 100 c.c. of citrated blood. Temperature reaction—103 degrees. (Fig. 1.) No occult blood in urine or feces.

Dec. 13, 1922. Intraperitoneal transfusion with 100 c.c. of citrated blood. Slight temperature reaction. Gradual improvement in blood picture.

Dec. 15, 1922. Color of skin and general condition is improved. No urobilin or urobilinogen in the urine.

Dec. 18, 1922. Intraperitoneal transfusion with 100 c.c. of citrated blood. Blood picture apparently normal mor-

*This case was reported in detail in a previous communication.

phologically. No change in size of spleen. Urine and feces negative for blood.

Dec. 29, 1922. General improvement with gain in weight. Spleen barely palpable. Duodenal contents shows no urobilinogen and 2,816 degrees urobilin.

Jan. 2, 1923. Duodenal contents shows no urobilinogen and 1,720 degrees urobilin.

Jan. 7, 1923. The blood picture has remained fairly uniform since the last transfusion. There has been a steady gain in weight.

Jan. 11, 1923. Blood values have dropped the past few days. The hemoglobin is 63 per cent; the red blood cells—3,450,000.

Jan. 12, 1923. Intraperitoneal transfusion of 150 c.c. citrated blood. Donor and recipient were cross-grouped. No occult blood in urine.

Jan. 15, 1923. Physical examination shows patient in good condition. Spleen palpable 3 cm. below costal margin.

Jan. 29, 1923. Dispensary note: Examination negative. Patient is active and contented. Weight 6,950 grams.

Subsequent course and treatment are given in Table III, and in an earlier communication.

Dr. H. S. Lippman was requested to examine the blood smears of this patient. As a result of his study, he allows me to present the data obtained by him. (Table I.)

The following summary has also been prepared by Dr. Lippman:

"Throughout the case the bone-marrow is reacting well as evidenced by large groups of platelets, slight leucocytosis, and red cells which appear when bone-marrow is stimulated, anisocytosis, polychromatophilia, and nucleated red cells. Naked erythrocytic nuclei are also present in the first few smears and these are definite evidence of bone-marrow hyperactivity.

"The lymphatic hemopoietic tissue also shows evidence of increased stimulation by the plasma cells, Rieder cells, and increased number of lymphocytes."

Blood transfusion was urgent in this case. Evidently the efforts of the bone-marrow to regenerate a sufficient supply of cells could not cope with the apparent destructive process taking place simultaneously. Every method of giving blood had already been used. After the present admission into the hospital, three intraperitoneal transfusions at short intervals were sufficient apparently to restore the blood picture to normal (Table II). The rapid improvement of the general condition and of the blood picture in particular were very gratifying. It is interesting to note that this patient has received over 1300 c.c. of blood intraperitoneally. What is the fate of the injected blood? Any theory other than that of absorption is difficult to interpret. The rise in blood values and the clinical effect on the patient are indicative. The disappearance of evidence of bone-marrow stimulation following the transfusions also points to absorption of the cells. It has been shown that the bone-marrow ceases to function when the body possesses too much blood, for example in animals made plethoric by transfusions[4].

Case 6 (H6653).—Purpura hemorrhagica.

History.—A boy, three years of age, was admitted to the hospital Nov. 9, 1922, complaining of bleeding from the right eye and ear, nose and throat and small "bluish spots"

TABLE I

Comparative Data Showing Differential Blood Counts and Morphological Changes
(Dr. H. S. Lippman)

Date	Hgb. %	R.B.C.	W.B.C.	P.M.N.	Lymph.	Nucleated R.B.C.	Remarks
Dec. 11, 1922	35.0	1.3	31,200	40.5	49.0	9 per 100 W. B. cells	Occasional Rieder and plasma cell. Good bone marrow reaction.
Dec. 15, 1922	54.6	2.8	16,400	44.0	47.5	8 per 100 W. B. cells	Good rise in hemoglobin and erythrocytes. Less evidence of lymph-node irritation.
Dec. 18, 1922	54.6	3.2	11,500	24.5	71.0	12 per 100 W. B. cells	Bone-marrow reaction continues. Rise in lymphocytes probably relative.
Dec. 20, 1922	59.5	4.25	10,600	26.0	68.5	.....	3 plasma cells.
Dec. 23, 1922	70.0	4.24	.....	36.5	59.0	½ per 100 W. B. cells	Practically no nucleated red cells. Slight anisocytosis. Red cells almost normal.
Dec. 30, 1922	66.5	3.84	14,400	26.0	67.0	½ per 100 W. B. cells	No change.
Jan. 4, 1923	70.0	4.09	13,000	36.0	55.0	0 per 100 W. B. cells	Normal smear.
Jan. 10, 1923	66.0	3.97	12,600	24.0	70.0	0 per 100 W. B. cells	Normal smear.

over entire body. The mother had noticed blue spots all over the child's body on November 8, 1922. On the day of admission the patient began to bleed from the right eye and ear. There was also an active hemorrhage from the nose and mouth.

Physical examination showed a well developed, well nourished, very listless patient with purpuric spots over entire body and blood oozing from the eye, ear, nose and throat.

There was active bleeding from the mucous membrane of the throat. The heart showed a systolic murmur at apex and base, which was not transmitted. The spleen was not palpable.

Laboratory Data on Entrance.—The urine showed a trace of albumen, numerous hyaline, granular, and waxy casts and many red blood cells and pus cells. The blood examination showed a hemoglobin of 65 per cent (Tallquist); red blood cells, 3,900,000; white blood cells, 10,200—with a normal differential count. The platelet count was 35,000. The patient was in Group III. The bleeding time was over three hours; the clotting time 30 min. (?).

Subsequent Notes.—November 9, 1922. Within two hours after admission to the ward the patient received 200 c.c. of citrated blood (Group IV) intravenously. The median basilic vein was exposed and transfusion performed. Immediately following the transfusion, the routine post-operative procedures were put into effect.

Nov. 10, 1922. Patient showed a slight temperature reaction, 102.2 degrees. Active hemorrhage started again at 2:30 A. M. and at 9:00 A. M. the pulse was barely perceptible. The median basilic vein of the other arm was exposed and 450 c.c. of citrated blood was introduced. Moderate hemorrhage followed the second transfusion. Bleeding stopped completely several hours later.

Nov. 11, 1922. No hemorrhage. Much improved.

Nov. 15, 1922. Intraperitoneal transfusion with 70 c.c. citrated blood. All specimens of feces were negative with

TABLE II

Comparative Data Regarding Hemoglobin and Erythrocyte Counts (Case No. 5)

Date	Time	Blood counts Hgb. %	R.B.C.	Remarks
Dec. 11, 1922	4:30 P. M.	35.0	1,310,000	Intraperitoneal transfusion with 100 c.c. citrated blood (mother donor)
Dec. 12, 1922	10:00 A. M.	38.0	1,520,000	
,.....	3:00 P. M.	35.0	1,720,000	
Dec. 13, 1922	A. M.	35.0	1,830,000	Intraperitoneal transfusion with 100 c.c. citrated blood (new donor)
Dec. 14, 1922	A. M.	35.0	1,750,000	
Dec. 15, 1922	A. M.	54.6	2,810,000	
Dec. 16, 1922	A. M.	56.0	2,990,000	
Dec. 18, 1922	10:00 A. M.	54.6	3,250,000	Intraperitoneal transfusion with 100 c.c. citrated blood (same donor) at 11:00 A. M.
	12:00 P. M.	56.0	3,820,000	
	2:00 P. M.	59.5	4,120,000	
	4:00 P. M.	56.0	3,420,000	
Dec. 19, 1922	4:00 P. M.	56.0	4,390,000	
Dec. 20, 1922	A. M.	59.5	4,250,000	
Dec. 21, 1922	A. M.	70.0	4,670,000	
Dec. 22, 1922	A. M.	63.0	4,000,000	
Dec. 23, 1922	A. M.	63.0	4,240,000	
Dec. 26, 1922	A. M.	77.0	4,120,000	
Dec. 29, 1922	A. M.	66.5	3,900,000	
Dec. 30, 1922	A. M.	66.5	3,840,000	
Jan. 2, 1923	A. M.	66.5	4,250,000	
Jan. 4, 1923	A. M.	70.0	4,090,000	
Jan. 6, 1923	A. M.	70.0	4,250,000	
Jan. 8, 1923	A. M.	63.0	3,710,000	
Jan. 10, 1923	A. M.	66.0	3,970,000	
Jan. 12, 1923	8:00 A. M.	59.5	3,040,000	
	10:00 A. M.	56.0	3,800,000	Intraperitoneal transfusion with 150 c.c citrated blood (same donor) at 9:00 A. M.
	11:00 A. M.	56.0	3,500,000	
	12:00 P. M.	56.0	3,370,000	
	1:00 P. M.	56.0	3,760,000	
	2:00 P. M.	58.0	3,670,000	
	3:00 P. M.	58.0	3,430,000	
Jan. 13, 1923	A. M.	63.0	3,140,000	
Jan. 15, 1923	A. M.	63.0	3,410,000	
Jan. 16, 1923	A. M.	63.0	3,490,000	

the benzidine and a negative guaiac reaction. Other specimens were negative.

Nov. 16, 1922. General condition good. Purpuric spots beginning to fade.

Nov. 18, 1922. Given 300 c.c. citrated blood intraperitoneally. Moderate temperature reaction. No subjective symptoms. Urine and feces specimens were negative for occult blood.

Nov. 21, 1922. Gradual improvement. Purpuric rash almost gone.

Nov. 22, 1922. Intraperitoneal transfusion with 200 c.c. citrated blood with no temperature or pulse reaction.

Dec. 6, 1922. The patient is improving daily. The blood picture is normal.

Dec. 12, 1922. The tonsils and adenoids have been removed with only a moderate reaction.

Jan. 25, 1923. Dispensary note. The patient is in excellent condition.

Upon entrance into the hospital, the only measure considered was an immediate intravenous transfusion. This was done twice to overcome the acute condition. The virulence of the infecting agent can be realized if one considers that, after the intravenous introduction of 700 c.c. of blood (the total blood volume of the patient is approximately 1000 c.c.), the blood values were 30 per cent hgb., 1,656,000 red blood cells respectively. After the hemorrhage was stopped, the intraperitoneal method was utilized to hasten recovery. Data available and results obtained are shown in Table III.

POST-MORTEM STUDIES

The opportunity to examine the peritoneal contents of patients who have received transfusions is limited. Evidence of blood absorption and of blood destruction through indirect methods are neces-

TABLE II—*Continued*

Comparative Data Regarding Hemoglobin and Erythrocyte Counts (Case No. 5)

Date	Time	Blood counts Hgb. %	R.B.C.	Remarks
Jan. 18, 1923	A. M.	63.0	3,800,000	
Jan. 20, 1923	A. M.	60.5	4,200,000	
Jan. 21, 1923	A. M.	62.0	3,900,000	
Jan. 25, 1923	A. M.	60.0	3,890,000	
Jan. 27, 1923	A. M.	63.0	4,000,000	
Feb. 16, 1923	.....	38.5	2,780,000	
Feb. 21, 1923	.....	32.0	2,300,000	
Feb. 23, 1923	A. M.	32.0	2,280,000	
Feb. 26, 1923	.....	28.0	2,150,000	Intraperitoneal transfusion with 100 c.c. citrated blood (4:00 P. M.)
Feb. 27, 1923	9:00 A. M.	31.5	2,440,000	
	2:00 P. M.	35.0	2,550,000	
Feb. 28, 1923	9:00 A. M.	31.5	2,160,000	
Mar. 3, 1923	.....	35.0	2,600,000	
Mar. 7, 1923	.....	35.0	2,450,000	
Mar. 29, 1923	.....	21.0	1,380,000	Has received *x*-ray, ultra-violet rays and Fowler's solution
Mar. 31, 1923	9:00 A. M.	21.0	1,430,000	Intraperitoneal transfusion with 100 c.c. citrated blood (9:00 A. M.)
	3:00 P. M.	21.0	1,530,000	
Apr. 1, 1923	A. M.	21.0	1,600,000	
Apr. 2, 1923	10:00 A. M.	28.0	1,810,000	Intraperitoneal transfusion with 100 c.c. citrated blood (9:00 A. M.)
	3:00 P. M.	28.0	1,800,000	
Apr. 3, 1923	10:00 A. M.	28.0	1,920,000	
	3:00 P. M.	38.5	2,380,000	
Apr. 4, 1923	.....	38.5	3,000,000	Intraperitoneal transfusion with 100 c.c. citrated blood (9:00 A. M.)
Apr. 6, 1923	.....	45.0	3,830,000	
Apr. 7, 1923	.....	45.0	3,800,000	
Apr. 9, 1923	.....	45.0	3,800,000	
Apr. 11, 1923	.....	45.0	3,400,000	
Apr. 12, 1923	.....	56.0	3,500,000	Intraperitoneal transfusion with 150 c.c. citrated blood
Apr. 17, 1923	.....	....	3,300,000	
Apr. 18, 1923	.....	52.0	3,480,000	

sarily subject to criticism. Methods available at the present time are not satisfactory. Consequently direct observation is the only certain way of determining whether blood is absorbed from the abdominal cavity. Observations of this character are few in number. Opportunities for study following injury of some organ in the abdominal cavity, while more numerous, present problems not directly comparable with those resulting from intraperitoneal transfusions. The following cases are reported in an attempt to gain more direct and accurate data upon this question.

CASE 7 (H7287).—Athrepsia.

A girl aged seven weeks was brought into the hospital Dec. 7, 1922. The complaint was undernutrition. The physical examination showed marked underdevelopment and dehydration. The weight on entrance was 2,060 grams. There was very little improvement in her condition during the week following her admission. She was given a sinus transfusion of 60 c.c. citrated blood, but there was no rise in blood values.

Dec. 18, 1922. Weight, 2,300 grams. Feeding changed from Czerny's butter-flour mixture to casein milk because of a developing diarrhea.

Dec. 20, 1922. Given 100 c.c. citrated blood intraperitoneally.

Dec. 23, 1922. Sudden cyanotic attack with labored respiration. Temperature 97 degrees F. There is evidence of bronchopneumonia in the right lower lobe. The patient died two days later.

Post-mortem findings showed 50 c.c. of thick, viscous blood in the peritoneal cavity. There were no clots, adhesions or evidence of peritonitis. There was a massive bilateral bronchopneumonia.

CASE 8 (I-33).—Streptococcic meningitis.

A girl aged ten months was brought into the hospital January 2, 1923, complaining of cough, fever, and fretfulness of four days' duration. The physical examination showed an apathetic infant with a markedly bulging anterior fontanelle; neck rigidity; median strabismus; tâche cerebrale; and a positive Babinsky and Kernig. The urine examination was negative. The leucocyte count was 18,000. The spinal fluid was milky and under increased pressure; the Nonne was positive; cell count 7,700 cells per cu. mm. and smears showed numerous streptococci.

Jan. 4, 1923. Spinal fluid shows 43,000 cells per cu. mm. The patient is moribund. She was given 100 c.c. of citrated blood intraperitoneally at noon and died twelve hours later.

Post-mortem findings showed apparently no absorption. The smears of the abdominal contents showed unchanged red blood corpuscles.

CASE 9.—Service of Dr. Max Seham. A boy, seven weeks old, admitted to hospital care Jan. 7, 1923, because of persistent vomiting and loss of weight. The present illness started January 1, 1923, with projectile vomiting. The fluid loss was replaced by rectal and intraperitoneal injections of saline. On January 19, the abdomen was opened under local anesthesia and a Rammstedt operation performed.

Immediately following the operation, food was retained for longer periods, but vomiting continued. Intraperitoneal blood was given thirty-six hours before death (January 21, 1923).

The post-mortem showed approximately 80 c.c. of fluid and clotted blood in the peritoneal cavity.

CASE 10 (I-3997).—Prematurity athrepsia, lues.

A two months' premature baby girl was admitted to the hospital because of failure to gain in weight and constipation. The baby had been breast fed the first two weeks of life and then placed on Borden's Eagle Brand condensed milk without showing any gain. On entrance, the weight was 2,170 grams. Physical examination showed an extremely emaciated, dehydrated infant.

The laboratory findings showed an essentially negative urine. The blood picture was 38.5 per cent hemoglobin; 2,600,000 red blood cells; 23,200 leucocytes with 46 per cent polymorphonuclears and 50 per cent lymphocytes. The Wassermann reaction was repeatedly positive.

For two days after the entrance the baby received normal saline intraperitoneally (125 c.c. b.i.d.). On the third day, it was given 75 c.c. of citrated blood intraperitoneally. There was no reaction. Its weight gradually increased to 2,790 grams and she appeared somewhat improved. On the third day, the course became rapidly worse. The patient died six days after the transfusion.

At the post-mortem the peritoneal cavity was perfectly clean and showed no trace of blood. There were no clots, adhesions, or evidences of peritonitis.

An analysis of our post-mortem results is of interest. In order to present them more clearly we have tabulated the data obtained (Table IV).

These results indicate clearly, in our opinion, that, in these cases, we may have a contraindication towards the intraperitoneal injection of blood. While the post-mortem findings have failed to show any evidence of harm resulting from the procedure they have shown that its value is questionable in this type of case. The clinical condition of these patients must be considered. At the time of the transfusion all physiological processes were undoubtedly slowed. However, if absorption does not take place within a reasonable period in cases of athrepsia, the intraperitoneal route is not justified. Its value, we believe, is directly proportional to the rapidity of absorption of the blood from the peritoneal cavity.

DISCUSSION

a. Puncture of the Peritoneal Cavity.

The introduction of a needle into the abdominal cavity, while theoretically fraught with danger, has been shown by numerous observers to be safe practically. With the proper training and precautions,

abdominal puncture is harmless. The introduction of saline and glucose solutions into the peritoneal cavity is done almost routinely in many pediatric centers without ill effects. The popularity of the method and its harmlessness are attested to by the abundant literature on this subject. We recently had the opportunity of observing two cases at post-mortem, who had received 25 to 50 intraperitoneal injections of normal saline respectively. There was no evidence of peritonitis or adhesions in either case.

b. Value of Blood in the Peritoneal Cavity.

In a previous paper we have shown, in some detail, the importance of blood in the abdominal cavity. We pointed out that patients suffering internal hemorrhages recover much more rapidly than others who lose an equivalent amount of blood externally. We also emphasized the significant fact

TABLE III

Comparative Data Regarding Hemoglobin and Erythrocyte Counts (Case No. 9)

Date	Time	Blood counts Hgb. %	R.B.C.	Platelet count	Remarks
Nov. 9, 1922	5:00 P. M.	65.0	3,900,000	35,000	Intravenous transfusion 200 c.c. citrated blood
Nov. 10, 1922	9:00 A. M.	45.5	3,170,000	45,000	Intravenous transfusion 450 c.c. citrated blood
Nov. 14, 1922	A. M.	30.0	1,656,000	65,000	
Nov. 15, 1922	9:00 A. M.	40.0	2,140,000		Intraperitoneal transfusion with 70 c.c. of citrated blood at 10 A. M.
	1:00 P. M.	34.0	1,600,000		
	2:00 P. M.	34.0	1,940,000		
	3:00 P. M.	34.0	1,810,000		
	4:00 P. M.	34.0	2,000,000		
Nov. 16, 1922	9:00 A. M.	38.0	2,000,000	65,000	
	3:00 P. M.	42.0	2,050,000		
Nov. 17, 1922	A. M.	49.0	2,400,000	250,000	
Nov. 18, 1922	10:00 A. M.	38.0	2,000,000		Intraperitoneal transfusion with 300 c.c. citrated blood at 11:00 A. M.
	12:00 P. M.	44.8	2,438,000		
	3:00 P. M.	48.0	2,550,000		
Nov. 19, 1922	A. M.	53.0	2,640,000		
Nov. 20, 1922	A. M.	49.0	2,670,000	245,000	
Nov. 21, 1922	A. M.	48.0	2,760,000		
Nov. 23, 1922	A. M.	51.0	2,900,000		
Nov. 24, 1922	A. M.	56.0	3,370,000	320,000	
Nov. 25, 1922	A. M.	61.0	3,600,000	510,000	
Nov. 27, 1922	A. M.	61.0	3,220,000		
Nov. 28, 1922	8:00 A. M.	56.0	3,500,000	400,000	Intraperitoneal transfusion with 200 c.c. citrated blood at 9:00 A. M.
Nov.	11:00 A. M.	66.5	4,070,000	335,000	
	12:00 P. M.	70.0	4,230,000		
	2:00 P. M.	70.0	4,340,000		
	3:00 P. M.	65.0	3,880,000		
	4:00 P. M.	66.5	4,350,000		
Nov. 29, 1922	P. M.	59.0	3,900,000		
Dec. 1, 1922	A. M.	73.5	4,460,000		
Dec. 2, 1922	A. M.	77.0	4,350,000		
Dec. 5, 1922	A. M.	77.0	4,800,000	205,000	
Dec. 6, 1922	A. M.	80.0	5,000,000		
Dec. 7, 1922	A. M.	80.0	5,000,000		
Dec. 16, 1922	A. M.	80.0	4,390,000		
Dec. 19, 1922	A. M.	80.0	4,560,000		

that auto-transfusion and retransfusion of blood obtained from the peritoneal cavity is being used successfully.

Free blood in the abdomen has been shown to be harmful because of the danger of clots with the subsequent formation of adhesions. For obvious reasons, the presence of citrated blood has not been, as yet, proved harmful. Available data obtained at post-mortem would tend to show that its presence in the peritoneal cavity is without ill effect. We are at present engaged in a histological study of available clinical cases and hope to report the results obtained later.

c. Absorptive Power of the Peritoneal Cavity.

We realize that the application of animal experimentation to human beings has its limitations. However, it is felt that a thorough discussion and a careful clinical application may be of practical importance.

A careful review of the literature shows that we have undoubtedly under-estimated the absorptive capacity of the abdominal cavity and, furthermore, have to a large extent failed to avail ourselves of this property, and utilize this knowledge.

The mechanism involved is of considerable importance. Von Recklinghausen, Notkin, Beck, Muscatello, Meltzer, MacCallum, and others support the lymphatic theory of absorption. On the other hand, men like Starling and Tubby, Hamburger, Mendel, Dandy and Rowntree favor the blood-vessel theory of absorption.

Later evidence favors the lmyphatic theory. It has been shown repeatedly that the lymphatics of the diaphragm play a very important rôle in the process of absorption. Cunningham[5], in a very thorough and conservative paper, has recently made the following statement: "The results of my own experiments indicate that most, if not all, of the transfer of granular material from the peritoneal cavity into the diaphragmatic lymphatics, during the first 30 min., takes place by means of a type of phagocytosis. That later on leucocytes do bring in loads of granules is undoubted, but it seems very likely that the large inflow of free granules continues so long as any remain free in the peritoneal cavity."

Rate of absorption, for obvious reasons, can only be estimated by indirect methods. We have shown that rabbits can absorb one-fifth of their total blood volume in approximately three hours. It may be assumed for the present that many factors are involved. The general condition of the patient; the amount of blood transfused; the number of transfusions already given; the interval between transfusions; the condition of the donor's and recipient's blood; the rate and depth of respiration; the movements of the diaphragm; the intra-abdominal pressure; and possibly many other factors are of importance. Bolton[6] has shown that movements caused by artificial respiration were sufficient to force materials from the peritoneal cavity into the lymphatics of the diaphragm of animals dead for

TABLE IV

Data showing results obtained at post-mortem (Intraperitoneal transfusion)

Case No.	Age	Weight in Grams	Condition of patient	Diagnosis	Amount injected c.c.	Autopsy	Amount recovered c.c.	Remarks
H5325	23 days	2,350	Poor	Decomposition (Athrepsia)	100	3 days	30	Fluid blood; no adhesions; no clots
H7287	49 days	2,300	Poor	Athrepsia	100	5 days	50	Thick viscous; no clots or adhesions
I 33 H	10 mos.	....	Critical	Streptococci meningitis	100	12 hrs.	100	No absorption
12	42 days	2,700	Serious	Pyloris Stenosis with operation	100	36 hrs.	80	Fluid blood and clots; no absorption
I 1127	41 days	2,490	Serious	Prematurity 3° Cleft Palate	100	48 hrs.	20	No clots; no adhesions
I 3997	42 days	2,170	Serious	Prematurity—Lues	75	6 days	0	No clots; no adhesions; no peritonitis

several hours. The possible importance of auto-agglutinins and isoagglutinins in the blood may deserve consideration.

At the present time, the only means of estimating rate of absorption are the temperature curve and the repeated blood examinations. Their value is of course doubtful from a scientific standpoint. However, we are inclined to think from the available data that the rate of absorption of citrated blood from the peritoneal cavity of the child is at first very rapid, then gradually slows down until the process is completed. Further research along this line is needed. The ultimate question is not one of absorption, but rate of absorption.

d. Comparative Reactions and Results Following Intraperitoneal and Intravenous Transfusions.

Careful observations of temperature reactions show more or less characteristic curves. It has been noted that, in our cases at least, both intraperitoneal and intravenous transfusions are followed, in most instances, by some degree of reaction. Most careful attention to technical details has been unable, in our hands, to obviate this reaction.

In Figures 1 and 2 there have been gathered together a series of typical reactions following blood transfusions. It can be seen at once that we are dealing with two types of curves. The sudden sharp rise with the sharp fall seem to be characteristic of the intravenous transfusion.

The slower rise, plateau, and gradual drop are apparently as characteristic of the intraperitoneal transfusion. It may be noted that fairly severe reactions may occur from the use of either route. However, the intravenous injection of blood seems to give the more severe temperature rise. It needs to be emphasized, though, that the reactions were, in all instances, only transitory, and had apparently no deleterious effect upon the patient.

As might be expected, the pulse rate as a rule goes hand in hand with the rise in temperature. It apparently returns to normal sooner than the latter. At no time were the pulse rates alarming and no irregularity of heart-beat discernible.

General symptoms, such as malaise, headache, pain, etc., were noted in a minor degree in a few cases. They applied equally well to both forms of

TABLE V

Data showing results obtained following intravenous transfusion

Case No.	Age	Condition of patient	Diagnosis	Amt. of blood transfused c.c.	Blood Picture: Before transfusion Hgb. %	Before transfusion R.B.C.	After transfusion Hgb. %	After transfusion R.B.C.	Remarks
H7287	7 wks.	Poor	Athrepsia	60	...	4,870,000	...	4,870,000	No effect
H7075	6 wks.	Serious	Athrepsia	60	75.0	4,010,000	70.0	4,540,000	Rise in red count; no clinical change
I 440	9 wks.	Poor	Athrepsia	80	63.0	3,890,000	78.4	5,430,000	Marked improvement
H7152	2 mos.	Serious	Athrepsia Broncho-pneumonia	100	80.0	4,400,000	...	5,200,000	Definite rise in red cells
H6046	(?)	Serious	Athrepsia Dehydration	50	85.0	4,450,000	...	.....	Died 2 days later
H5102	3 mos.	Poor	Congenital lues; Acute otitis media	150	70.0	3,100,000	91.0	5,400,000	Marked improvement
H6656	3 yrs.	Serious	Purpura Hemorrhagica	650	65.0	3,900,000	30.0	1,656,000	Blood destruction
I 2044	9 mos.	Poor	Malnutrition	100	75.0	3,500,000	56.0	4,600,000	Good result
I 987	17 days	Serious	Prematurity	50	...	.....	...	.....	No effect clinically
I 2545	5½ yrs.	Poor	Hemorrhagic Nephritis	300	24.0	1,800,000	42.0	3,000,000	Good result
I 1926	6 yrs.	Poor	Pulmonary Tuberculosis	300	56.0	3,300,000	84.0	4,400,000	Good result

TABLE VI

Data showing results obtained following intraperitoneal transfusion

Case No.	Age	Condition of patient	Diagnosis	Amt. of blood transfused c.c.	Blood Picture: Before transfusion Hgb. %	Before transfusion R.B.C.	After transfusion Hgb. %	After transfusion R.B.C. (variable periods)	Remarks
H4981	2 yrs.	Fair	Secondary Anemia	50	38.0	4,000,000	45.0	4,300,000	
		9 days later		100	45.0	4,500,000	55.0	6,000,000	Marked improvement
H5102	3 mos.	Poor	Congenital lues	50	59.5	3,980,000	56.0	4,280,000	No clinical results
H5694	16 mos.	Poor	Hemoglobinuria	50	28.0	3,760,000	35.0	4,300,000	
		2 days later		50	29.4	4,170,000	35.0	4,000,000	Values rose two days later to 43.4% and 4,700,000
		6 days later		150	52.5	5,440,000	49.0	5,400,000	Values rose next day to 52.5% and 6,260,000
H6131	2 yrs.	Poor	Malnutrition	150	90.0 (Dare)	4,320,000	85.0 (Dare)	4,610,000	See Table I
H6481	3 mos.	Poor	Athrepsia	50	70.0	3,400,000	70.0	3,640,000	Good clinical result; blood picture not improved
		3 days later		50	...	.....	68.0	3,900,000	
		2 days later		100	...	.....	70.0	4,000,000	
H6419	15 mos.	Fair	Secondary anemia; Rickets	50	50.0	3,900,000	65.0	5,230,000	Taken 5 days later
		9 days later		100	...	.....	56.0	5,400,000	Taken 5 days later; good clinical result
H7356	5 mos.	Serious	Secondary Anemia	100	35.0	1,310,000	38.0	1,520,000	
		2 days later		100	35.0	1,830,000	54.6	2,810,000	Taken 2 days later
		5 days later		100	54.6	3,250,000	56.0	3,420,000	See Table III
		25 days later		100	59.5	3,040,000	58.0	3,430,000	
H6656	3 yrs.	Critical	Purpura Hemorrhagica	70	40.0	2,140,000	34.0	2,000,000	
		3 days later		300	38.0	2,000,000	48.0	2,550,000	
		10 days later		200	56.0	3,500,000	66.5	4,350,000	
I 1419	23 days	Serious	Prematurity Erysipelas	50	...	.....	...	.....	Died 12 days later; no clinical effect
I 2243	6 days	Serious	Prematurity 3° Cleft Palate	35	...	.....	...	.....	Good clinical effect
I 2183	7 wks.	Serious	Erysipelas Secondary anemia	70	...	.....	...	.....	Marked clinical improvement
Case of Dr. M. Gellman	11 mos.	Serious	Pneumonia Secondary anemia	150	20.0	2,800,000	60.0	4,310,000	Taken 6 days later

transfusion. These symptoms also were transitory, and cannot justly act as contraindications.

In Tables V and VI, we have summarized, for purposes of comparison, the results obtained after intraperitoneal and intravenous transfusions.

It can be seen that six out of eight cases receiving intraperitoneal transfusions were apparently benefited. In eleven other cases, receiving intravenous transfusions (Case 6046 died too soon for comparison), seven appeared to be improved. It is realized that direct comparisons, due to different etiological and clinical factors, cannot be made. Tentative conclusions are, however, justified.

The occasional limitations of even direct intravenous transfusions are shown. Any explanation, due to our present lack of knowledge concerning blood physiology[8] is necessarily uncertain. Blood destruction may apparently take place very rapidly without showing any evidence obtainable by routine laboratory procedures. Hoover and Blankenhorn[9] have demonstrated that bilirubin may be present in marked concentration in the plasma and yet not appear in the urine.

SUMMARY

We have discussed the general theoretical and practical considerations concerning the intraperitoneal transfusion of citrated blood. Based upon a considerable amount of laboratory and clinical data obtained from all available sources, we have pointed out the practicability of this method of giving blood during infancy and childhood. The necessity for such a method of approach, its simplicity of technique, its apparent harmlessness, and the beneficial results have all been discussed. We have tried to emphasize both in the present paper, and in previous communications that this method is proposed, not as a substitute for other methods already in use, but as an addition, of possible merit, to our pediatric armamentarium.

Laboratory experiments have preceded our clinical trials. Our clinical attempts have, we believe, met with a fair measure of success. Clinical results are especially striking in cases of anemia, that is, in cases requiring blood transfusions, not primarily as stimulative agents, but as restorers of blood loss.

The limitations of the intraperitoneal route, its possible dangers, and its ultimate value remain to be seen. Only carefully conducted laboratory and clinical investigations will tell us ultimately what we may expect from the abdominal cavity as a source of communication with the rest of the body.

The importance of the rate of absorption has been emphasized. Upon this may depend the future use of various other medications, for example, antitoxin.

CONCLUSIONS

1. The intraperitoneal transfusion of citrated blood has apparently given good results in clinical cases of anemia.

2. Its value in severe nutritional disturbances (athrepsia) is questionable.

3. Reactions following intraperitoneal transfusions are comparable to those following intravenous transfusions, but are apparently not as severe.

4. In over 50 clinical applications we have seen no harmful effect following the use of this procedure.

5. Carefully controlled clinical studies are essential to determine its possible future status.

It is again a pleasure to acknowledge Dr. E. J. Huenekens' kind permission to utilize and report the cases reviewed.

LITERATURE

1. Lewisohn, Richard: A new and greatly simplified method of blood transfusion. Med. Rec. 87:141, 1915.
2. Siperstein, David M., and Sansby, J. Martin: Intraperitoneal transfusion with citrated blood; an experimental study. Am. Jour. Dis. Child. 25:107 (Feb.) 1923.
3. Siperstein, David M.: Intraperitoneal transfusion with citrated blood; a clinical study. Am. Jour. Dis. Child., Mar., 1923.
4. Robertson, O. H.: The effects of experimental plethora on blood production. Jour. Exp. Med. 26:221-238, 1917.
5. Cunningham, R. S.: Studies in absorption from serous cavities: IV. On the passage of blood cells and granules of different sizes through the walls of the lymphatics in the diaphragm. V. The absorption of particulate matter from the peritoneal cavity of the fetus. Am. Jour. Physiol., Oct., 1922; 62, pp. 248-261.
6. Bolton:
7. Robertson, O. H., and Rous, Peyton: Sources of the antibodies developing after repeated transfusions. Jour. Exp. Med., Feb., 1922; 35; 141-153.
8. Rous, Peyton: Destruction of the red blood corpuscles in health and disease. Physiological Reviews. Jan., 1923; vol. iii, No. 1, pp. 75-106.
9. Hoover, C. F., and Blankenhorn, M. A.: Dissociated jaundice. Arch. Int. Med.; 1916; 18; 289-303.

THE TREATMENT OF NON-TUBERCULOUS PULMONARY SUPPURATION*

CARL A. HEDBLOM, M.D.
Section on Thoracic Surgery, Mayo Clinic
Rochester, Minnesota

Non-tuberculous pulmonary suppuration includes abscess, bronchiectasis, and suppurative pneumonitis. Pulmonary abscess may be acute, chronic, simple, multilocular, or multiple. Bronchiectasis may be localized or diffuse. Suppurative pneumonitis may involve a localized portion of a lung or a whole lobe. Bronchiectasis, as observed clinically, is usually chronic and of long standing. Suppurative pneumonitis is essentially acute. In chronic conditions abscess and bronchiectasis often co-exist, and either may be secondary to the other. The treatment of pulmonary suppuration, to be rational, must be based on the nature, localization, and clinical course of the disease in the given case.

1. In cases of pulmonary abscess, expectant treatment, bronchoscopic lavage, pneumothorax collapse, drainage, and partial or complete lobectomy have their advocates. In many acute cases there is secondary pleuritis of such an extent that localization, either by physical findings or *x*-ray, is impossible. Expectant treatment, in my opinion, is indicated in the early stages of the lesion, but before liquefaction has taken place drainage would probably be of no immediate benefit. In a considerable proportion of cases spontaneous cure results. Most cases, however, when observed at the Mayo Clinic had lasted long enough for a definite abscess to form. I believe that expectant treatment in such cases is indicated, only if patients show definite evidence of improvement, or at least if they hold their ground during a few weeks of observation. To continue expectant treatment indefinitely, unless there is such improvement, will allow the condition to become chronic, the patient will come to operation in relatively poor condition, and the results following operation will be much less satisfactory, because of the changes characteristic of a chronic process. Bronchoscopic lavage may be of some benefit in cases in which the abscess is located centrally, but such abscesses are likely to heal spontaneously. Pneumothorax collapse is probably of value in cases in which the abscess is located centrally because it promotes collapse of the abscess walls and this facilitates healing. In peripheral abscesses, on the other hand, the nearest exit for the pus is through the chest wall, and not through a bronchus, with perhaps a relatively narrow sinus opening which allows imperfect drainage. If the abscess is in the periphery, adhesions may be present which prevent collapse of the portion of the lung involved, or, if collapse is achieved, there is danger of rupture into the pleural cavity and of secondary empyema. Peripheral abscesses should be drained by a two-stage operation because of the protection afforded against infection of the pleural cavity, unless it can be shown definitely at the first operation that the pleura is adherent over the area involved. This point can usually be determined by inspection; if there are extensive adhesions, a marked thickening of the pleura underneath the endosteum of the excised rib or underneath the intercostal muscles will be found. In any case in which there is doubt as to the presence of extensive adhesions a two-stage operation is the safest course. In some cases, however, drainage is so urgently indicated that it may be safer to suture the pleura and to establish immediate drainage.

I have usually found it possible to localize the abscess definitely by means of the aspirating needle. With the needle in place, a tract is then burned to the abscess, affecting a wide open drainage of the abscess cavity. In a few cases in which it was impossible to localize the abscess by this means, a tract was burned to the area suspected and the drainage tract packed. In such cases the abscess is likely to break into the drainage tract later, or the tract may be further cauterized at later sittings. If the abscess is fairly large and there is severe coughing and much sputum, it is a distinct advantage to leave the ribs in place after separating the periosteum. The lung can then be sutured to the parietal pleura underneath the ribs; the ribs act as a splint, preventing pain and difficulty in raising sputum during the interval before the second stage of the operation, which is usually performed about a week later, when the abscess is localized with the aspirating needle and the ribs are resected. In cases of chronic abscess of long standing, in which the *x*-ray and physical findings show definite localization, cautery lobectomy according to the method of Graham, offers the best chance of cure. In my experience, however, hemorrhage has been a fatal complication in two

*Read before the meeting of the Southern Minnesota Medical Association at Mankato, Minnesota, May 19, 1924.

cases following cautery. In many chronic cases drainage is ineffective because of extensive sclerosis of the portion of the lung involved. A combination of drainage and cautery, particularly in cases of multiple abscesses, seems a rational procedure. Very large cavities ultimately heal, provided all the secondary pockets are widely drained.

2. Bronchiectasis is usually diffuse but may be localized. In the latter type, in which the *x*-ray shows a definite, sharply circumscribed shadow at the base, drainage has, in my experience, produced very marked improvement so long as the drainage opening has been kept patent. In the diffuse type of bronchiectasis, however, drainage is obviously contra-indicated. This condition has been generally considered practically incurable except by lobectomy; this operation has yielded a prohibitive mortality except possibly in a small group of selected cases in which the mortality has been about 50 per cent and the proportion of complete cures relatively low.

In cases of diffuse unilateral bronchiectasis, I have in the last few years performed a graded, extrapleural thoracoplasty. This operation, when sufficiently extensive to produce massive collapse of the involved portion of the lung, has resulted in improvement in all cases, and approximates a symptomatic cure in a considerable proportion. The operation has been performed typically in five stages: resection in two stages of the ribs posteriorly, including usually the third to the eleventh, resection of the remaining lower lateral segments, resection of the upper anterior segments, and resection of the remaining median segments of the upper ribs. Combined local and gas and oxygen, or ethylene anesthesia is used. After the resection of the posterior segments the nerve trunks are isolated and injected, under direct vision, with 95 per cent alcohol. The convalescence in these cases is relatively painless, and thus the patients do not object to a several stage operation. Coughing is also relatively painless, which is important in the prevention of retention of sputum, as the patient voluntarily inhibits the coughing reflex if coughing is painful. The third advantage in the injection of the nerve trunks is that the operative field for the resection of the anterior and lateral segments of the ribs is relatively free from pain. The anesthetic effect of the injection lasts for several months. Drainage is instituted for from twenty-four to forty-eight hours following each operation. Practically without exception, healing occurs by primary intention, and the patient is up and about usually within twenty-four or forty-eight hours. The operations are performed at intervals of about one week. Such treatment is obviously indicated only in cases of unilateral bronchiectasis. It may be difficult to determine whether the condition is unilateral or bilateral. It was unilateral in 28 per cent of 400 cases studied at the Mayo Clinic. There was a question as to whether it was unilateral or bilateral in 35 per cent. In this second group it may be impossible, by physical findings or by the *x*-ray or bronchoscopic examinations, to determine the extent of the involvement. A pneumothorax collapse of the side chiefly involved has been used as a therapeutic test. If, following complete collapse of the lung, the symptoms have largely disappeared, extrapleural collapse is indicated. If, on the other hand, the symptoms continue in large measure, the condition is regarded as probably bilateral, and operation is not advised.

3. In certain cases of pulmonary suppuration the patient's chief symptoms are a chronic cough and large amounts of purulent sputum. The physical findings and the *x*-ray show typical signs of a unilateral involvement, but owing to thickened pleura and shadows produced by pulmonary lesions it may be impossible to determine whether the condition is abscess or bronchiectasis, or a combination of the two. Drainage obviously is not to be considered. A question of lobectomy would have to include the possibility of resecting a whole lung. Extrapleural collapse is a relative indication. If there is a history of frequent exacerbation of fever, leukocytosis, and a poor general condition, it is probable that the primary condition was multiple abscess. Extrapleural collapse is ineffective because of the failure to produce better drainage, and in such cases the mortality will be considerable. If, however, the clinical course is essentially that of bronchiectasis alone, very marked improvement may be expected following extrapleural collapse.

Suppurative pneumonitis is a condition which usually occurs as a complication of multiple abscesses or of abscess secondary to bronchiectasis, and often is fatal. If the process is localized to one lobe, and the patient's general condition is satisfactory, a lobectomy seems the operation of choice.

Footnote: A large number of slides, illustrative of the various types of pulmonary suppuration and of operative technic, were shown.

CONCLUSIONS BASED ON THE STUDY OF 433 HAND INJURIES*

HAROLD E. HULLSIEK, M.D.
Miller Hospital Clinic
St. Paul

An attempt has been made in this paper to enumerate the methods used and conclusions arrived at through the investigation and study incident to the treatment of 433 hand injuries.

The reason, I believe, for lack of better functional results in a large percentage of injuries of the hands is to be found, not so much in the lack of knowledge of anatomy and pathology of these conditions, as it is in the indifference and lack of respect for the various tissues and their occasionally complicated and delicate mechanisms, together with a profound disregard for the formation of scar tissue and the resulting deformities. A tendon, with its extremely delicate gliding mechanism, cannot be grasped in a forceps as one grasps the fascia in an abdominal wound, without causing tissue death and hemorrhage, either condition being sufficient to put to naught an otherwise skillful repair. A finger that is incised longitudinally on its palmar aspect will not fold at its horizontal flexion crease nor will its tendon gliding mechanism function perfectly if the tendon slings are severed. An infection which is seen once in three or four days can advance until it is quite out of control, whereas very little progress in the wrong direction is made in twenty-four hours, and if the case is seen daily this can be arrested. Such omissions as the above are usually made not because of ignorance, but rather from the fact that the case is merely that of an infected finger or hand and therefore does not merit much consideration. In many fingers or hands partial or total permanent disability can be prevented simply by careful attention daily, and mere observance of ordinary surgical principles without any knowledge or technique, especial or peculiar to the hand itself.

Our series of cases were divided as follows:

Number of cases		433
Lacerations	171	
Cases coming to us as infections	99	
Contusions	96	
Fractures	54	
Phalanges	36	
Metcarpals	17	
Carpals	1	
Foreign bodies		36
Burns		12
Dislocations		4
Palmar space infections		5
Average period of disability for lacerations		5.3 days
Infections in primary wounds		4.8%

The lacerations were treated on the assumption that it is practically impossible to sterilize a traumatic wound and therefore (and this thought being of major importance) that the wound be not sutured or, in case sutures are used, a few widely separated ones loosely tied.

According to the accepted teaching if a wound is seen immediately or within a certain number of hours after its occurrence, it may be rendered aseptic as possible and closed tightly. There are at least two factors that may defeat our purpose in such treatment. The first is that of swelling due to the trauma associated with the injury. This, following the tight suturing, causes the suture to be put under still more tension, tending toward the cutting through of the sutures and increasing the likelihood of infection. Secondly, the ever present risk of infection in spite of attempts at cleansing. In the tightly sutured wound there is no chance for the escape of small amounts of serum or infectious material until these have increased in such amount as to be recognized and by that time caused serious damage.

A great many methods and solutions have been used in an attempt to render the surfaces of the wounds sterile: scrubbing with green soap and water, ether, iodin, saline, primary Dakinization and any one of these methods together with débridement. In extensive and deeply lacerated wounds a thorough débridement should be done, care being taken to remove all tissue irreparably destroyed, while being equally careful not to sacrifice any parts which aid in procuring a better cosmetic or functional result. Control of hemorrhage is not as important as it is in other regions due to the relative firmness of the part and the ability of moderate pressure to control bleeding. In primary tendon repair, however, the control of bleeding is very important as a small collection of blood in the tendon sheath may cause trouble-

*Read at the meeting of the staff of the Charles T. Miller Hospital, April 1, 1924.

some adhesions. In the repair of a tendon a thorough débridement is also necessary as any bruised or badly lacerated tendon is almost certain to slough. In wounds which are extensive, either lacerations or crushing injuries, or a combination of the two, the question of injury to tendons should be definitely settled insofar as it is possible before the patient is anesthetized, and then a careful investigation and the necessary repair done. It is very distressing to casually suture an apparently superficial wound and afterward find that an injured tendon has been overlooked.

In extensive wounds we follow the practice of cleaning the area about the wound with benzine, followed by alcohol or iodin. The gross dirt is cleaned out of the wound and all tissue which is hopelessly destroyed is removed. Not a great deal of attention is paid to the sterilizing of the wound itself; however, it seems to be of some value to wash out the wound with ether. The question of tetanus and the administration of antitoxin depend upon the conditions surrounding the patient's vocation. As most of our men were factory or shop workers tetanus antitoxin was used very rarely and we have no tetanus in our series.

Any of the stronger antiseptics which are caustics and therefore cause cell death, certainly diminish the regenerative power of the tissue and thus delay union. We have occasionally used blue ointment as a primary wound dressing with good results as a preventive of infection but this has the disadvantage of leaving a moist, soggy wound the edges of which do not adhere by primary union. A dry wound is usually a clean wound, hence the importance of daily attention. Twenty-four hours after dressing a lacerated wound which has been débrided, the dressings are very carefully removed, the wound inspected and if any minute collections of secretion are seen they are gently removed with dry cloths; a dry dressing is then re-applied. It has not been sutured tightly and a collection of infectious material does not have to increase to any large amount before forcing itself to the surface. If any reddening or pain is noted the edges of the wound are spread slightly. If on the third or fourth day the signs of infection are certain the wound is treated in an entirely different manner and as an infection. In fractures of the phalanges or metacarpals complicated with wounds on the flexor surface, the daily attention is especially important as the position of the hand over the roller allows for moisture to collect on the palm. If not changed for thirty-six or forty-eight hours such a wound will almost certainly become infected with the possibility of the infection extending down to the bone. It is almost impossible to treat ideally a fracture and an infection in the same finger or metacarpal as the principles applied in the treatment of one condition are contraindicated in the other. The hand should be cleaned up and powdered daily and there is no danger of disturbing the fragments if the dressing is done carefully.

The idea of trying to save every available bit of finger in partial or nearly complete amputations in the distal half of the finger has been consistently carried out. Very often a finger tip which appears hopelessly severed from its blood supply may be saved by carefully placing it in position and holding it in place with adhesive or a suture to two. Where part of the distal phalanx has been lost and it is important either from the nature of the patient's vocation, or for cosmetic reasons, to increase the finger to as near normal length as possible, the celluloid cuff method of Davis may be tried. A celluloid cuff encircling the finger and extending one inch beyond the end is used as a mould for the granulations, which are allowed and encouraged, to build up the end of the finger. In our series this was tried on two fingers with the addition of about one-fourth of an inch in one case and enough in the other to prevent the necessity of shortening the bone to procure a painless stump.

In lacerations or contusions involving the nail where the nail is raised from its bed, usually at the base, the nail is left in place, but a small piece excised to allow for the escape of blood. In clipping out a piece of nail, care should be exercised not to cut into or traumatize the matrix, as such treatment will result in a deformed nail.

In the repair of tendons the most scrupulous care is to be used in an attempt at as perfect asepsis as possible. Only the gentlest handling of these very delicate tissues with the careful avoidance of even the slightest trauma. As has been mentioned above, it is a waste of time to suture together crushed or lacerated tendons, as owing to the comparatively poor blood supply the tendon is sure to slough. In primary tendon repairs the necessity for supplying a gliding mechanism is not usually present but occasionally a tendon is destroyed over such a distance as to leave a defect which can only be bridged by a tendon graft including the

sheath or paratenon. Depending upon the length of the defect a graft may be taken from the sublimus tendon of the same or another finger, the palmaris longus or various other locations. The ends of the tendon should be approximated as accurately as possible without ragged edges and the sutures applied very carefully. Considering the fact that the suture takes up the pull on working the tendon for several weeks, it is readily seen that a method must be used of firm and lasting application of the suture. The ordinary suture passed through the ends of the tendon and tied will pull out quite promptly and cannot be used. Several methods of suture have been devised, any of which is quite satisfactory.

A tendon is surrounded by a sheath or epitenon only where it changes its direction. In its straight course it is surrounded by loose, flexible long-fibered, fatty tissue called paratenon. This loose connective tissue shows a marked difference, histologically, from ordinary fatty connective tissue. This tissue is adherent to and slides back and forth with the movements of the tendon. In secondary tendon repair following an infection, a gliding mechanism must be furnished if the sheath is destroyed over any great distance if one expects any degree of motion. This means transplanting a tendon, plus its sheath or paratenon. If the tendon is planted directly without paratenon or sheath it gradually becomes adherent to the short-fibered, non-elastic connective tissue and finally is held immobile. Grafts may be obtained from the sublimus, palmaris longus, long extensors of the toes or other regions; paratenon fat may be obtained over the triceps tendon and planted in the sleeve about the tendon. If the injury necessitates suturing the tendon in the middle of the finger enough tendon should be removed to allow one end of the graft to be sutured to the distal phalanx, the other end sutured to the proximal fragment in the palm where limiting adhesions are of less consequence, thus having no suture line in the course of the tendon through the finger. It is not practical to attempt to replace both deep and superficial flexors in the fingers, the profundus only being used in the repair. To do a successful tendon repair and have any degree of function the joints must be quite freely movable as a repaired tendon obviously is not strong enough to loosen up stiffened joints. The limiting adhesions in the joint should be broken up by massage and baking and put into a condition of maximum flexibility before attempting the repair. If the adhesions do not loosen up or if a chronic arthritis is present a repair is useless. The bed in which the tendon is to be received should be loose and succulent tissue with a good blood supply, not the hard, shiny, reddened, fibrous finger through which the storm of an infection has passed. If the finger is the seat of scars and contractures it may be necessary to make a whole thickness graft in order to prepare a proper tunnel for the new tendon. If this is necessary it may be advisable to amputate the finger rather than go through a prolonged series of operations which may easily result in failure. After the repair, motion should be started early, probably the fourth or fifth day, very carefully of course, but motion none the less, to prevent the organization of microscopic clots and resultant binding adhesions.

Fractures.—Because of the compensation and litigation aspect of our cases we are very anxious to have recorded every fracture, no matter how small and apparently unimportant. For this reason radiographs were made in all cases where there was the slightest possibility of a fracture being present. In spite of including in our series a great number of cases in which the chance for a break was comparatively slight the number positive for fracture was over 50 per cent of the total radiographed. I think this illustrates the fact that fractures of the bones in the hand occur a great deal oftener than are suspected or discovered. This may seem relatively unimportant but in addition to the fact that at least some of the fractures of phalanges or metacarpals unite improperly and with poor or painful function, if not discovered and treated, there is the additional knowledge that in industrial cases an unrecognized fracture, even though it be a trivial injury, can be made to assume gigantic and fearful proportions before a jury.

The fractures of the phalanges and metacarpals are treated in a like manner, simply by putting the hand up in flexion around a roller bandage about 1.5 inches thick and extending across the hand. In cases with much displacement we use nitrous oxide and flex the hand and fingers tightly over the roller bandage. This effectively approximates the fragments and in case of the metacarpals prevents inward or palmar knuckling with a painful callus in the palm. In the case of fractures of the

distal phalanges no splints are used at all unless the patient desires to continue working, when the finger is splinted in extension.

We had in our series thirty-six fractured phalanges and seventeen metacarpals with good results in all but four fractured phalanges in which the fracture extended into the joint, and one metacarpal which became badly infected and in which union was delayed for some time.

Infections.—The average period from the time of receiving the wound or abrasion causing the infection until first treated by us was five and three-tenths days. The number of infections was ninety-nine. The number of infections occurring in wounds treated by us as primary wounds was 4.8 per cent. The ninety-nine cases include only those which were diagnosed as infections at the time of the first visit. In these are included simple infections of the skin and subepithelium tissues, paronychia, infections of the sub-aponeurotic and subcutaneous spaces, tendon sheath infections, palmar space infections and lymphangitis when limited to the hand and forearm. In the entire series only three varieties of antiseptics were used, boric acid, saline and Dakin solution. I am quite firm in the opinion that there are three things of paramount importance in the treatment of hand infections and these are, drainage, heat and moisture. I believe it makes very little difference what the moisture consists of, boric acid, alcohol, bichloride, potassium permanganate, Ringer's solution, glucose, sterile water or any one of the various solutions which have been used, so long as the strength or character of the solution does not irritate the tissue. Salt solution was used in cases treated at home, as common salt is to be found in every home. This obviates the necessity of explaining to the men about boric acid. The cases treated with salt solution apparently did as well as those treated with boric acid. In an infection which is not serious enough to warrant hospitalization the man is advised to go home and put the hand in a vessel of hot salt solution in the proportion of 1 teaspoonful to a quart of water, leaving it immersed 15 minutes every hour. Between the saline baths he is instructed to wrap several wet towels about the hand and forearm and put the hand on a hot water bag.

Paronychia are treated in the mild and early cases merely by raising the epithelium at the edge of the nail, draining the small collection of pus and packing in a small bit of gauze, followed by wet dressings. In the more extensive cases an incision is made through the skin parallel to the edge of the nail and extending well below the sulcus of the nail, the triangular flap thus made is raised, the portion of the nail which has been elevated by the pus is removed, care again being taken not to injure the matrix or the epithelial margin at the base of the nail and thus causing subsequent deformity of the nail. Wet dressings are then used and the inflammation and pain then usually subside quite promptly.

There are, according to Kanavel, six fascial spaces in the hand, viz.: the middle palmar, thenar, hypothenar, dorsal aponeurotic, dorsal subcutaneous and lumbrical. Three of these spaces are very important and the other three are relatively unimportant. Each space receives its infection along certain definite routes and each in turn passes the infection along through equally fixed channels.

Infections of the subcutaneous and sub-aponeurotic spaces are to be drained as promptly as the exact location of the pus can be determined. This may necessitate seeing the patient two or three times before incision but also prevents the possibility of making several incisions without finding pus. The localization of these abscesses can be aided by going over the involved area from the periphery to the center with a point or pencil or applicator until the tenderest area is found. In the majority of cases this will quite accurately locate the collection of pus. As to the incision it should be made with the resultant scar in mind and the degree of limitation of function which may result. We have ceased entirely making longitudinal incisions on the palmar surfaces of the fingers, as these result in longitudinal scars which are forced to bend in flexion of the fingers and which are more or less disabling. A great many flexor surface infections of the fingers have been opened by transverse incisions extending completely across the finger. These heal up rapidly and with a minimum of disability and although apparently contrary to the tenets of anatomy seem of practical value. A Mayo scissors is probably the ideal instrument for opening pockets in the hand, especially if there is a sinus in which to insert one blade of the scissors. Even where the skin is unbroken a small opening may be made through the skin and then the scissors used. By cutting the skin carefully with the scissors, using the closed points of

the scissors as a finder, there is less risk of harming important structures than when a knife is used.

I would like to emphasize again the advisability of delaying incision in fascial space infections until one is certain of the location of the abscess. I believe nothing is gained in premature incision made in the hope that benefit will be derived from relief of tension, even if pus is not found. I think no harm was ever done by waiting until a diagnosis can be made. This is in contra-distinction to the incision in synovial sheath infections, which should be made at the earliest possible moment, and in a lymphangitis, in which it should be delayed as long as possible.

As to the anesthetic used I do not believe there is any question. An infection that is of any extent or in an important place that is opened under a local anesthetic is accomplished more by luck than otherwise if done correctly. Nitrous oxide was used in fully 95 per cent of our cases. This or ether gives the operator sufficient time, a quiet field and is not painful to the patient.

Wide incision of the space involved followed by hot boric dressings without the use of drains has been our rule. Rubber tube drains are to be discarded because of the risk of pressure necrosis and a gauze drain soon becomes filled with coagulated secretions and blood, forming a plug which obstructs drainage rather than promotes it. If it is thought necessary to insert some sort of drain to keep the edges of the wound from falling together, thickly vaselined gauze acts very well. The dressing should be changed daily or oftener if the discharge is profuse. Moist dressings are very valuable but should not be used after they have outlived their usefulness as they promote excessive granulations and tend to macerate the tissues, keeping them boggy and soft. After the acute process has been controlled, a dry dressing is all that is necessary if adequate incisions have been made.

Synovial sheath infections are surgically important because of the destruction which occurs, the rapidity with which the process advances and the possibility of rapid spread of the infection if the condition is untreated. A tendon sheath may become infected directly through a crushing injury or laceration or from a slight abrasion or even a prick of a needle. The finger in such case is found to be edematous, both on the flexor surface and the dorsum, the patient complains of tenderness on pressure at all points but it will be found that firm pressure applied over the tendon itself is quite out of proportion to pressure over the other areas. This extreme tenderness will be found to follow the course of the sheath. On passive extension of the finger the pain is very marked and usually most severe at the proximal phalanx, the finger is held in flexion and this differs from the flexion of a fascial space infection in that motion is much more painful. The three cardinal symptoms then of tendon sheath involvement, are: first, excessive tenderness along the course of the tendon; second, excruciating pain on extension; third, position of flexion. The diagnosis is often fairly easy and can usually be made without difficulty.

Incision should be made down to the distended sheath and then the sheath incised, as far as the infection has extended. The incision may be made at the sides of the fingers and not on the flexor surfaces, one side or both sides of the finger may be incised, and the incision may be continuous, but if possible may be interrupted opposite the middle of the shafts of the phalanges, thus avoiding slings which hold the tendon taut and also preventing prolapse of the tendon. The size of the opening is of prime importance and must be large enough to drain the infected area freely. It is better to have it too large than too small. If the entire finger is involved the proximal and middle phalanges should be opened, incision in the distal phalanx being usually unnecessary. The proximal end of the incision is carried down into the palm according to the amount of palmar involvement. If the lumbrical space is involved the lateral incision is carried down the lumbrical muscle. If this involvement has not occurred, incision is made in the midline over the palmar end of the sheath and extends from the flexion crease at the base of the proximal phalanx about three-fourths of an inch into the palm.

Infections involving the fingers traverse different routes and involve different areas depending upon the finger primarily involved and whether the infection is lymphatic, fascial or through the synovial sheath. Fascial space infection in the index finger may spread dorsally onto the back of the hand, into the webbed space between the first and second fingers or along the lumbrical muscle and thus into the middle palmar space. If the metacarpo-phalangeal joint of the finger is also involved with destruction the flexor space may be involved.

In the thumb fascial infection does not tend toward the thenar space but rather away from it. In the second and third fingers the route lies also toward the dorsum of the hand and toward the mid-palmar space. In the little finger it is uncommon but the infection may burrow into the middle palmar space.

As to the spread of synovial sheath infections: this also varies in the different fingers. In the index finger the pus, having ruptured from the proximal end of the sheath, lies in the loose connective tissue about the lumbrical muscle, along which it extends and finally ruptures through a thin sheet of fascia into the thenar space.

In the invasion of the flexor longus pollicis of the thumb the sheath ruptures, allowing the pus to come to the surface, or it extends down the radial bursa. From here it may find its way into the ulnar bursa through a direct communication which often exists, or by rupture. If the sheath ruptures in its distal part it may thus become a fascial space infection and pass to the thenar space.

In the second finger the extension is to the mid-palmar space and in the third finger the same. In the fourth finger in cases where the sheath connects with the ulnar bursa, this becomes involved. In this finger rupture at the proximal end of the sheath may take place, the pus then reaching either the bursa or the mid-palmar space.

Extension by means of rupture through the ends of the radial and ulnar bursa is the common cause of deep abscesses in the forearm. These may be drained by lateral incisions at the level of the flexor surfaces of the radius and ulna, communicating with one another under the tendon of the flexor profundis.

The importance and value of proper treatment of fascial space and tendon sheath infections, and thus preventing extension to the palmar spaces, is shown by the fact that we had only five cases in ninety-nine infections in which the palmar spaces were drained. In three cases it was found necessary to amputate a finger either because of hopeless necrosis of tendons, combined with an extensive infection, or of involvement of the bone itself.

In our cases in which the mid-palmar space was drained the incision was made after the technique outlined by Kanavel. An incision is made on the flexor surface of the palm along the lumbrical muscle of the second, third and fourth finger, depending upon where the most marked involvement lies, preferably between the second and third finger. The incision is carried down to the tendons, the forceps is inserted between the tendons and the points spread apart in the space beneath and a small strip of vaseline gauze inserted. To open and drain the thenar space an incision is made opposite the middle of the index metcarpal on a level with its flexor surface.

The after-treatment of fascial space infections consists of hot, moist dressings, together with active and passive motion very early. Following the clearing up of the infection, massage, moist and dry heat and diathermy are very valuable. We have found that these procedures under our personal guidance, or of one trained in physio-therapy, are infinitely more beneficial than when left to the discretion of the patient, who does not realize that the valuable time he is spending waiting for the joints to become less painful, is also being spent in firmly organizing the exudate which later will permanently disable him.

In our burn cases, none of which were very extensive, we used 2 per cent salicaine ointment, which we believe has some anesthetic effect, thus rendering the injury less painful. The saline is used later to keep the tissues soft, remove the crusts and exudate and allow motion with less pain and thus prevent contraction. In two of the burns, grafts were used to hasten epithelialization.

SOME NEW PROBLEMS IN OBSTETRICS*

W. H. CONDIT, M.D.
Minneapolis

The scientific, economic, social and mechanical problems of the day are taxing the skill of the best minds to the extreme. Second to none is the problem of the automobile, which is influencing to no small degree all classes of society. The automobile as a means of transportation is with us to stay and is causing a marked increase in casualties to human life, antepartum as well as to those already on the way to the age of discretion and individual responsibility.

Accidents to intrauterine life and how to prevent them is a problem which daily confronts our profession. We are all asked the question by the antepartum and postpartum mother, "How soon can I ride in a motor car?" and almost as often, "When can I drive one?"

What are the factors incident to the accidents that present for consideration? I have classified them as (a) Mechanical, (b) Physical, and (c) Emotional.

Mechanical Factors.—The mechanical irritations are varied and in many ways cause abortions, miscarriages and premature labor, most often from direct violence to the mother. We have recently noted many more anomalies in the fetal cord, such as complex knots, coils about the neck and fetal extremities and, of much more moment, turns under the axilla over the shoulder and then around the neck, which predispose to strangulation of the cord against the bony parts in the last few moments of the second stage, thus stimulating the fetus to inspire in the lower canal or even causing death from direct strangulation of the cord. These observations have necessitated unusual care and caution in watching the fetal heart during the last of the second stage and in three cases I feel sure this concern saved the life of the fetus in each instance. The pulse becoming slow, irregular and arrhythmical, forceps were immediately applied and delivery hastened, resulting in a living child, which otherwise would have been lost. I urge all who have not the aid of an assistant to watch the fetal heartbeat, to wear the head stethoscope and use it after every pain during the latter part of the second stage of labor. The three cases above mentioned were all cord complications.

This same mechanical stimulation can cause more abnormal positions and presentations, which always contribute additional hazards to a successful delivery. Again, we may have this factor causing premature rupture of the fetal membranes or premature separation of the placenta, which may be very slight, causing only a mild hemorrhage, contributing to placental infarcts and their complications, or producing any degree of hemorrhage to complete separation.

It has been my experience with these patients who drive motor cars and insist upon doing so up to or near maturity, to have premature or false labor, requiring absolute rest in bed for seven to ten days, in order that the uterine muscle may recover so that the contractions would have some muscular strength and efficiency. One patient in particular who had false pains for three days, with no progress, was put in bed and as long as quiet, would experience no contractions, but the slightest movement, as going to the toilet, would stimulate this irritable, tired muscle to contractions. Rest in bed for five days, use of small doses of morphine and chloral, brought about a recovery of the muscle strength of the uterus. Another test of labor resulted in irregular pains during the second stage, one intermission of one hour without a single contraction, then a precipitate delivery with one good pain. This patient was of special interest, as this was her fourth delivery, the second and third being precipitate following a very short labor.

Physical Factors.—The physical disturbances may not contribute so materially to complications of pregnancy as the mechanical, but still have no small share. Long journeys by motor contribute to general physical tiring, muscular pains, especially backache, particularly riding in the rear seat, which is set on the incline, causing more intra-abdominal pressure on and irritation to the uterus. Inability to empty the bladder and bowel when the call of nature demands is no slight irritation to the physical economy, especially if there be an unusual tendency to constipation or bladder irri-

*Read before the Southern Minnesota Medical Association, Mankato, May, 1924.

tation. Any interference with normal elimination and metabolism in the mother contributes to nutritional impairment in the embryo. Long distance motoring contributes to digestive disturbances in irregularity of meals and inability to secure the proper foods.

Emotional Factors.—Last but not least, is the emotional feature accompanying motoring—for example, riding at night in a storm or on uncertain roads, with apprehension of danger or accidents. I have had two patients abort at the third month of gestation from anxiety and fear attending a trip in a rain storm on slippery roads, without an accident or any mechanical disturbance. Again, sudden emotion on just missing running down an individual or the killing of an animal or fowl along the road is detrimental. Many pregnant women are so sentimental about their condition that they will not inform a driver of their delicate condition in order that more caution in driving be taken.

How are we to educate our patients on these points and impress upon them the gravity of the hazards attending motoring? I have anticipated presenting my patients with printed instructions. I always inquire whether they are accustomed to ride frequently in motor vehicles or whether they drive one. I instruct my patients to absolutely forego riding in a motor vehicle, especially the crowded, rough riding bus, during the first, third, seventh and last months of gestation, to avoid rough or long trips at any time and when riding, to choose the front seat, which has a right angle position and good foot support.

CONCLUSIONS

1. Without question transportation in an automobile very materially increases intrauterine complications of pregnancy and intrauterine death of the fetus.

2. We, as professional advisers and promulgators of prophylactic medicine, are in duty bound to warn our pregnant women of these hazards.

3. By intelligent instruction to our prospective mothers, we can no doubt diminish these accidents.

4. This new hazard, added to the many attendant on the pregnant state, is one that will add mortality and morbidity to the mother as well as the fetus. This subject doubly demands our attention in an effort to reduce the mortality which is still second only to that from tuberculosis.

PNEUMONIA AND ITS TREATMENT WITH PNEUMOCOCCUS ANTIGEN*

DONALD B. PRITCHARD, M.D.
Winona, Minn.

During and following the influenza epidemic of 1918 there has been a very great morbidity from pneumonia and the mortality has been very high. This is my excuse for burdening you with a paper at this time. I confess that I have hesitated to appear before a meeting of medical men to tell them of my experience with the use of pneumococcus antigen in the treatment of pneumonia because of the difficulty in evaluating the results of any form of treatment in this disease. To those who have had no experience with pneumococcus antigen in the treatment of pneumonia it may appear that I either do not know a pneumonia when I see it or that I am greatly exaggerating the results obtained. From October 6, 1918, to May 1, 1924, I cared for 124 cases of pneumonia, all but one of which was more or less thoroughly treated with pneumococcus antigen, a method developed by Dr. E. C. Rosenow.

This antigen consists of a salt solution suspension of partially autolyzed highly virulent pneumococci of the different types. The autolysis under ether at 37° is allowed to proceed until nearly all organisms have become gram negative and suspensions have lost their toxicity as determined by intravenous injection in guinea pigs, and subcutaneous injection in man. The dose for adults consists of 1 c.c. containing twenty billion partially autolyzed organisms, subcutaneously, daily until the temperature becomes normal and remains so for one or two days, or until it is apparent that it has no good effect. Rosenow has shown that the anti-bodies increase more rapidly, the local and constitutional reaction is much less marked than following injection of the ordinary pneumococcus vaccine and that, with the partially autolyzed dead organisms, animals can be protected against otherwise fatal doses of highly virulent pneumococci, if treatment is begun soon after inoculation of the test organisms.

In my review there has been a total mortality of nine, or slightly over 7 per cent, but the death rate tells only a part of the story. Of the 124 cases, forty were twelve years of age or under, eighty-

*Read before the Southern Minnesota Medical Association, Mankato, May, 1924.

four were over twelve, and six of these were over seventy-five years of age. There were fifteen lobar and twenty-four broncho-pneumonias in those of twelve years of age or under, and forty-one lobar and forty-four broncho-pneumonias in those over twelve years of age. Of the lobar pneumonias twenty-nine involved the left lung, fourteen the right lung, and in two cases both lungs. In the remaining eleven patients my notes do not specifically specify the area involved. The broncho-pneumonias were more or less generalized. In some only a comparatively small area was involved while in others it was very extensively scattered over both lungs.

First I will briefly detail the cases that died.

An old nephritic case developed in the afternoon a severe hemorrhagic pneumonitis. When I saw him a short time after, he had crepitation and râles all over both lungs. The temperature was 104.6, pulse and respiration were very rapid, he was decidedly cyanotic, coughing up great quantities of blood. I gave him a dose of pneumococcus antigen but he died in twenty hours.

A man, age thirty-six, weighing considerably over three hundred pounds, 5 feet 9 inches tall, had been sick for three days following a preceding attack of influenza. His temperature was 103, pulse 146, respirations 48, he was very cyanotic, and both lungs were involved in an extensive broncho-pneumonia. I gave him a dose of antigen and in eighteen hours he died.

A girl, age seventeen, with no preceding illness, developed a lobar pneumonia involving the lower lobe of the left lung and in two days after administration of pneumococcus antigen she apparently recovered, her pulse, temperature, and respirations having become normal. Four days later she complained of severe headache, was vomiting, and died of a cerebral meningitis in four days.

Two other patients, an uncle and a niece in the same household, both ill at about the same time with influenza, were attacked with broncho-pneumonia which gradually grew worse as they became intensely cyanosed, and in spite of antigen both died without its seeming to have the slightest effect.

A man of 74 years, who had a hemiplegia of the right side due to an arteriosclerosis and recent cerebral hemorrhage, sickened with broncho-pneumonia, from which he died on the fifth day.

A woman, aged 78, had influenza followed by a broncho-pneumonia, from which she was apparently quite convalescent in three days. Two days later she developed an acute mania, and died in ten days.

A child, aged 4, seen when she had been ill for several days with a broncho-pneumonia following measles, died on the tenth day after I saw her, showing no response to treatment.

A little girl, aged 8, had been sick with influenza seven days when I called to see another member of the family and before leaving I asked how the little girl was. They said that she was still in bed but that she was better and that they expected she would be up the next day. I went into her room to greet her; her skin was cool and of good color, pulse not over 80, respirations not hurried, and she looked as if there was nothing much the matter with her. As I turned to leave the room, I thought I had better take her temperature, which I did, and to my surprise she had a mouth temperature of 103. I examined her chest and she had an extensive broncho-pneumonia that undoubtedly had been present for some time. On that day my supply of pneumococcus antigen was exhausted but the next morning (they lived some miles in the country) I called to see her. She was then practically pulseless at the wrist, respirations were rapid, she was very dull and apathetic, and cyanosed. I did not administer antigen and she was dead within three hours.

In none of the 124 cases treated did empyema develop, which I think is significant. I have included all the pneumonias seen by me from October 6, 1918, to May 1, 1924, and except the case noted all received more or less antigen. If you will bear with me for a few minutes more I will describe a few of the rather striking results obtained.

I have already spoken of the rather startling result in the first case in which I administered it. In a girl of seven, suffering from a sudden and very acute atttack of broncho-pneumonia following influenza, with a very high temperature, rapid pulse, rapid respiration, crepitations, and râles generally distributed throughout the chest, in twelve hours after a dose of antigen the temperature, pulse and respiration had practically attained normal and in twenty-four hours she was convalescent. It is no wonder that I doubted my senses, as this was my first experience with it.

Early in the epidemic one of the pupil nurses

in the hospital came down with influenza and on the morning of the third day her temperature was normal and she seemed to be on the way to convalesce. In the early afternoon they telephoned me that she was very much worse. Her temperature had reached 104.6°, pulse 120, respiration 30, and she was coughing a great deal, raising a bright red sputum, and complaining of sharp pain in the chest, but the physical findings were not very definite. She looked anxious and she was a very sick girl. I at once administered pneumococcus antigen. The next morning she was very much better and there was a definitely dull area with blowing breathing in the lower lobe of the right lung. Another dose of antigen was given. The next morning she was apparently well. I had no more antigen to give her. Two days later she began running a temperature and on the third day she seemed to be as ill as when I first saw her. On the fourth day I gave her another dose of antigen, with results similar to the effect of the first. In two days she was again convalescent. This time she had three doses on successive days and made a prompt recovery.

At about this time I had a young man with a hemorrhagic pneumotitis, who coughed up great quantities of blood. He had been a brewery worker for years and was not a good subject for pneumonia. I gave him two doses, twenty-four hours apart, and as I was again out of antigen he got none until three days later. In the meantime his temperature shot up, his cough and hemorrhages recurred, when I was again able to give him a dose for two days in succession. On the second day after that he began coughing, temperature and pulse went up, which continued for two days, when I was able to give him some more antigen, and this time I continued it for three doses, after which he remained well.

In February, 1921, I saw in consultation with Dr. Scherer, of Duluth, a five year old girl who had been sick with influenza for three or four days, and after being dismissed by the doctor at his morning visit he was called back in the afternoon and found his patient very ill with oncoming broncho-pneumonia. The family telephoned for me and at 9 a. m., the next day, about twenty hours after the onset of the pneumonia, I saw her with Dr. Scherer. She had passed a very bad night, her temperature was high, pulse and respiration rapid, and she was mildly delirious. She had a well developed and extensive broncho-pneumonia. We administered pneumococcus antigen and at 9 p. m., some twelve hours later, we saw her again, and the record showed that in the early afternoon improvement began and proceeded rapidly, and at this visit her temperature, pulse, respiration had practically reached normal, her nervous condition had become greatly improved, and the further progress was a prompt and uneventful recovery.

This spring I saw two extensive broncho-pneumonias following measles. They promptly subsided so far as the toxemia of the pneumonia went and they were practically over it within 48 hours. One of them, a boy twelve years of age, sick three days with measles, his mouth temperature 105.2°, pulse 170 and not of good quality, respirations ranging from 55 to 60, was extremely cyanotic and the alae of his nose were dilated. He had an extensive broncho-pneumonia throughout both lungs. I gave him 1 c.c. of the antigen and when I saw him the next morning, twenty-four hours later, his color was good. The rectal temperature had dropped to 101.2°, mouth 100, pulse 124, respirations 30, but he seemed to be rather dull and apathetic. The antigen was repeated and he made an uneventful recovery.

There were two other cases of hemorrhagic pneumotitis with unusually severe onset which recovered within forty-eight hours after administration of pneumococcus antigen.

Three years ago a girl, aged four, became ill with a left lower lobe infection. She began quite acutely and twelve hours after her first dose of pneumococcus antigen her temperature, pulse, respirations had reached normal. At my visit the next morning she was as ill as at my first visit. She was given a second dose of antigen and at night the symptoms had markedly abated, but the next morning she had again become as ill as ever. I repeated the antigen and at night, while she had again seemingly recovered, I repeated the dose and for the next two days I gave the injections morning and evening and her recovery was prompt.

Time will not permit the citation of many other cases with seemingly marked beneficial effects.

I am aware that some of these cases might have aborted without pneumococcus antigen, but not with the uniformity that I have experienced. I have been in practice for thirty-seven years and can recall but one case of pneumonia that aborted

in twenty-four hours excepting those treated with the antigen.

In some cases the effect is not so striking and recovery is by gradual daily improvement, extending over six or seven days. Success depends upon early diagnosis and treatment. I would almost as soon care for diphtheria without diphtheria antitoxin as to be responsible for pneumonia without pneumococcus antigen, and I have had experience in both diseases with and without these remedial agents. Dr. Rosenow has done much to advance medicine, but I think this product of his brain, while of great value to the practitioner, is the least appreciated of his contributions.

A MEDICAL CENTER IN THE ORIENT

"The visitor to Peking today who has had no warning in advance is surprised to find on the site of what was once the palace of a Chinese prince, a group of beautiful buildings which make a somewhat puzzling impression. At first glance they seem to be of classic Chinese architecture. The curved roofs of glazed tiles, the elaboratory decorated eaves, the formal courts, the white marble steps and balustrades, the main gate guarded by archaic lions—all seem characteristically Chinese. But on closer examination other features are noted. The buildings are of brick, two, three, or even four stories high. The windows are large and glazed. Yonder rises a tall chimney evidently belonging to a powerhouse. Half hidden at one side one recognizes the storage tank of a gas-plant. Here evidently is an institution of the West which has assumed some outer aspects of the East. It is the Peking Union Medical College, built, equipped, and maintained with funds supplied by the Rockefeller Foundation through the China Medical Board.

"In these laboratories, classrooms, and hospital pavilions teaching and research are being carried on in the modern scientific spirit, by well-trained men and women from many parts of the world. The 78 members of the medical school and hospital staffs who hold medical degrees represent 38 medical colleges of 11 different countries. In increasing numbers Chinese scientists and doctors are being welcomed as members of the faculty and advanced to positions of responsibility. In a premedical course students are being prepared to enter the regular undergraduate medical school. A school of nursing is a part of the plan. Graduate students, Chinese physicians, and medical missionaries on furlough from their stations are pursuing special studies or serving as voluntary assistants. From time to time brief intensive courses are organized in medicine, surgery, the clinical specialties, the fundamental laboratory sciences, and roentgenology for groups of doctors who wish to keep abreast of recent progress. Visiting professors from America and Europe have a share in these courses as well as in other teaching, and bring to the institution the stimulus of their ability, experience, personality, and prestige.

"The main scientific and professional aims of the College are: (1) to provide an undergraduate medical training of high standard, (2) to afford facilities to physicians for graduate work, (3) to give special preparation to prospective medical teachers and investigators, (4) to offer opportunities to staff members and advanced students for research, especially with respect to diseases of the Orient, and (5) in various ways to increase popular knowledge of the methods and meaning of modern medicine. The College is a development of an institution founded under missionary auspices. It seeks to perpetuate ideals of high character and loyal service and to work in sympathetic relations with the missionary movement and with the Chinese themselves."—*The Rockefeller Foundation.*

TEN WAYS TO KILL A MEDICAL SOCIETY

Don't go to the meetings.

If you do go, go late.

If the weather doesn't suit you, don't think of going.

If you do attend a meeting, find fault with the work of the officers and members.

Never accept office, as it is easier to criticize than to do things.

Get sore if you are not appointed on committees, but if you are do not attend committee meetings.

If asked by the chairman to give your opinion on some matter, tell him you have nothing to say. After the meeting tell everyone how things should be done.

Do nothing more than absolutely necessary, but when members use their ability to help matters along, howl that the institution is run by a clique.

Hold back your dues, or don't pay at all.

Don't bother about getting new members. "Let George do it."—*Pittsburgh Medical Journal.*

MINNESOTA MEDICINE

Official Journal Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, and Minneapolis Surgical Society

Owned and Published by
The Minnesota State Medical Association
Under the Direction of Its
EDITING AND PUBLISHING COMMITTEE

R. E. Farr, M.D., Minneapolis
John M. Armstrong, M.D., St. Paul
L. B. Wilson, M.D., Rochester
F. L. Adair, M.D., Minneapolis
J. T. Christison, M.D., St. Paul

EDITORIAL OFFICE
CARL B. DRAKE, M.D., Editor
402 Guardian Life Bldg., Saint Paul

BUSINESS OFFICE
J. R. BRUCE, Business Manager
402 Guardian Life Bldg., Saint Paul
Telephone: Cedar 1683
201 Commercial Bldg., Minneapolis
Telephone: Atlantic 2716

All correspondence regarding editorial matters, articles, advertisements, subscription rates, etc., should be addressed to the Journal itself, not to individuals.

All advertisements are received subject to the approval of the Council on Pharmacy and Chemistry of the American Medical Association.

The rate for classified advertising is five cents per word with a minimum charge of $1.00 for each insertion. Remittance should accompany order. Display advertising rates will be furnished on request.

Contents of this publication protected by copyright.

Subscription Price: $3.00 per annum in advance. Single Copies 25c. Foreign Countries $3.50 per annum.

Vol. VII OCTOBER, 1924 No. 10

EDITORIAL

The Pasteurization of Milk

Milk is one of our most valuable and most extensively used foods. It is also a very ready medium through which certain communicable diseases may be spread if measures are not taken to safeguard it. A safe milk supply is now recognized as one of the fundamental requirements in the protection of public health.

The most economical and effective method of rendering milk safe, and the one which is universally recognized, is pasteurization. Health authorities now agree that all market milk should be pasteurized, unless it has been produced and handled under conditions similar to those required for certified milk. Pasteurization should not be counted on to make up for lax or unclean methods of production; its purpose is primarily to overcome certain dangers in raw milk which even the most highly developed systems of dairy inspection may not eliminate.

Milk is pasteurized by heating it to a temperature not lower than 145° F. for not less than thirty minutes, and then promptly cooling it to 50° F., or below. Pasteurization under this method does not render the milk sterile, but makes it safe insofar as the transmission of disease is concerned. A number of types of harmless but desirable bacteria which cause milk to sour are not killed by this heating process, so that pasteurized milk sours in the same manner as raw milk, although the time it remains sweet is prolonged about twenty-four hours.

The process of pasteurization as carried out at the present time by the "holding" method causes no appreciable chemical change in the milk; it tastes practically the same as raw milk and the food value is not materially affected.

Milk, unlike any other single food, contains all three vitamins and the effect that pasteurization may have on them is of importance. Fat-soluble vitamin A and water-soluble vitamin B are quite resistant to heat and it is agreed that pasteurization has little or no effect upon them. The antiscorbutic vitamin C is sensitive to heat at about 122° F. While the destruction of this vitamin depends upon the temperature, length, and condition of heating, as well as on the reaction of the material in which it exists, pasteurization of milk undoubtedly weakens the antiscorbutic property of the milk to some extent. It has been found that milk freshly drawn from the cow at certain times of the year does not always contain a sufficient quantity of vitamin C to protect against scurvy. This variation in the vitamin content of the milk is determined by the kind of food which the cow receives. Since even fresh, raw milk may not contain a sufficient quantity of vitamin C, most physicians recommend that this vitamin which is present in orange juice, tomato juice, etc., be added to the diet when cows' milk is substituted for breast milk. In view of the fact that vitamin C must be substituted in the infant's diet regardless of whether or not the milk is pasteurized, a partial destruction of this vitamin resulting from pasteurization is of little practical importance. Since adults do not depend on milk as a source of vitamin C, pasteurization cannot be said to have a detrimental effect on the food value of milk insofar as they are concerned.

In consideration of the protection against disease that proper pasteurization offers, there is no longer any question as to the value of the process from a health point of view. In cities where all of the supply is pasteurized, milk-borne diseases have been practically eliminated. The United

States Department of Agriculture makes the statement that "no epidemic of disease has ever been traced to properly pasteurized milk."

H. A. W.

The State Meeting

For the first time in history our State Association, at its annual convention, is to be the guest of St. Cloud. Until recently it was considered that the hotel facilities of St. Cloud made it impossible to meet there. With the completion of the Breen Hotel this difficulty has been removed, although the local committee expects such a crowd that the hospitality of private homes will have to be accepted. The St. Cloud physicians and, in fact, the residents in general, are apparently going to show what royal entertainment they can extend. Each and every member is urged to do his best to attend.

The St. Cloud convention will afford a good opportunity for our wives to go on a little spree. They are to receive special entertainment and St. Cloud has some interesting activities worth seeing, for instance, the granite quarries, paper mill and State reformatory. And then there is golf.

A perusal of the scientific program which appears elsewhere in this issue should convince one that the program committee has arranged something which promises to be worth going to St. Cloud to hear. Of course, the addresses are to be published later, but reading a journal is not a good substitute for meeting your professional friends and holding those informal professional discussions which are so valuable.

The innovation of publishing the committee recommendations in advance of the meeting has been carried out this year and the reports appear in this issue. The advisability of attempting to establish a state medical library is brought up in an editorial. The suggestion has been made to the secretary of the Association that we establish a fund for the financial assistance of the needy ones in our ranks, particularly the aged and incapacitated. There is much to recommend such a step. These matters should receive the consideration of members and particularly the delegates in advance of the meeting, so think them over.

The absence of two of our prominent members is going to detract from our full enjoyment of the meeting. The illness of our president, Dr. Archibald MacLaren, will prevent his attending and presiding at our sessions. We shall all miss him greatly and sincerely hope for his speedy recovery. It is more than to be regretted that Dr. Beebe, who has played such a prominent part in the medical life of our Association and who was responsible for the choice of St. Cloud for this year's convention, will not be there to greet us.

Dr. E. T. Sanderson, our first vice president, expects to be present at St. Cloud and will preside.

Till we meet in St. Cloud, then!

A State Medical Library

Several of the larger county medical societies have medical libraries for the use of their members. Perhaps 50 per cent of the physicians in the state, however, are without the use of a first-class library. They must depend upon the few books and periodicals they have individually been able to get together. This is a distinct disadvantage when it comes to keeping up with medical progress or preparing medical papers.

There is a medical library, state supported to be sure, at the University. Recently it has been fused with the biology and dentistry libraries to form a department of about 50,000 volumes in the University library. During the summer the medical books were transferred to the new University library building which, by the way, is a magnificent structure. The University library is admittedly for the use primarily of the faculty and secondarily of the students of the University. No provision has been made for the loan of books to outside individuals. Possibly, however, if a demand for a circulation department of the medical library were shown, this could be obtained with little effort.

Circulatory medical libraries do exist. That of the Medical Society of the County of Kings in Brooklyn and that of the College of Physicians and Surgeons in Philadelphia are notable examples. The Surgeon General's library in Washington loans medical literature extensively, but only through a reliable organization such as a county society library.

New York has maintained a state medical library at Albany for many years. Three years ago a medical branch of the Iowa State library was established with its own librarian and quarters in the Historical Society Building at Des Moines. This latter may well serve as an example of the need and practicability of such an institution. Ten years ago the State librarian in Iowa, convinced

of the need of medical books in the State library, began to accumulate a few volumes. In 1920 the General Assembly of Iowa created a medical department. A small appropriation is made each year for a librarian's salary and the purchase of books and periodicals. Assisted by contributions from various sources, the library now has some 5,000 volumes. It is reported that 10 per cent of the profession outside of Des Moines and 5 per cent of the profession in the city use the library. This percentage will doubtless increase as the library becomes better established.

Our State maintains a library of some 90,000 volumes at the State Capitol for the law profession. It is worth while for the State to furnish facilities for self betterment to the lawyers. Why does not the same apply to the medical profession? A lawyer can go to the state house and camp in the library. A physician, in most instances, could not and the service of a medical library would be largely through the loan of literature.

Iowa has a state medical library; why not Minnesota? The time is propitious to take up the matter at our state medical meeting this month and provide for a thorough investigation of the proposition.

COMMITTEE REPORTS

The following reports have been submitted by the chairmen of the respective committees and are published for the consideration of the members of the Association and particularly the delegates, in advance of the annual meeting:

COMMITTEE ON MEDICAL EDUCATION AND HOSPITALS

To the President and House of Delegates of the Minnesota State Medical Society:

Gentlemen: Your Committee on Medical Education and Hospitals has the honor of submitting the following report:

FIRST: HOSPITALS:

In its work of raising the standards of hospitals the Council on Medical Education and Hospitals of the American Medical Association has adopted the plan of publishing a list of hospitals approved by it for the training of interns.

In addition to an investigation of each hospital by a representative of the Council from the home office at Chicago, the Committee on Medical Education and Hospitals of the state in which any hospital applying for approval is located is asked to make an independent investigation and report to the Council. Your Committee was requested to make one such survey during the year, namely, of the New Asbury Hospital of Minneapolis. The survey was made and the hospital recommended for approval by the Council. Seventeen hospitals in Minnesota are now approved for the training of interns.

SECOND: MEDICAL EDUCATION:

The Committee on Medical Education and Hospitals of last year, headed by Dr. Braasch, made a very comprehensive and valuable report on both undergraduate and graduate medical education in Minnesota.

Your present Committee will therefore not go into any detail concerning the present status of medical education in the state, but will first take up the recommendations of Dr. Braasch's Committee to see whether or not the profession of the state has profited by those wise proposals. Too often recommendations of Committees which have spent valuable time and concentrated effort on their work are literally thrown into the waste basket by the hackneyed motion "I move the report of the Committee be accepted and placed on file." Therefore, your present Committee makes but one recommendation with the hope that the Committee next year will be instructed to concentrate all its efforts on education to be carried to the physician in his own locality.

The recommendation of Dr. Braasch's Committee:

"That the University of Minnesota offer several courses of instruction at different periods of the year and possibly in a more concentrated form" has been carried out by the University.

In the spring, for two weeks, courses were offered "in a more concentrated form" in Medicine and Surgery, and in the fall for another two weeks in Pediatrics and Obstetrics and Gynecology, together with a one week's course in *x*-ray diagnosis, laboratory clinical and pathological diagnostic methods.

Another recommendation of last year's Committee was:

"That a system of graduate medical instruction be given by competent instructors in various portions of the state enabling the general practitioner to become familiar with recent medical progress." This has been taken up by your present Committee, which begs leave to make the following report of its investigations with recommendations for putting it into effect: Certain states, notably Wisconsin and North Carolina have undertaken to take instruction to the practitioner. Time and space will not permit a detailed description of this work but the essential features of the plan are these:

Wisconsin. "The purpose of the courses offered in postgraduate medical instruction is to provide physicians, residing in a given locality, with practical demonstrations of the newer methods of diagnosing and treating disease. Clinics are held at a hospital conveniently located, illustrated lectures are given, and opportunity is offered for consultations with specialists. Arrangements may be made for a single clinic and lecture or for a series of weekly, biweekly, or monthly clinics and lectures. Arrangements for these clinics and lectures are made through co-operation between the local physicians under whose auspices the clinics and lectures are held and the Dean of the University Extension Division. Physicians enrolling for the course are charged a fee sufficient to cover part of the overhead expenses, the balance is paid from the small appropriation made for this work by the state legislature. The following courses, each consisting of one clinic and one lecture, are offered:

Internal medicine, radiology, pediatrics, dermatology and

syphilis, neurology and psychiatry, genito-urinary diseases, orthopedics, laboratory diagnosis; diseases of the eye, ear, nose and throat; obstetrics and gynecology.

The courses are given by teachers from the University of Wisconsin and prominent professional men of the state.

In addition to these courses obstetrical films are exhibited and the cancer propaganda is conducted in harmony with the above courses by a committee of the State Medical Society of Wisconsin, illustrated by 125 slides.

North Carolina. In this state the work is also conducted by the University Extension Division.

Mr. Chester D. Snell, Director of the Extension work in a letter to Mr. R. R. Price, Director of the same work at the University of Minnesota, says:

"I should like to make it clear that the work which we are offering is regular post-graduate medical instruction, and is not devoted to clinics alone. Each class meeting last summer lasted about three hours, of which an hour and a half, approximately, was devoted to a lecture by the instructor and the rest of the time was taken up by clinical work. Some of the meetings lasted a whole afternoon when the classes got interested in the clinical work.

"We ran two circuits of six towns each last summer, and the total attendance in each circuit was one hundred each, or an average of seventeen in each group or class. This next summer we expect to run at least six circuits, and hope to have practically all the general practitioners in this state taking the work.

"Let me say that as far as we are able to judge, this work has been a tremendous success in this state, and we believe we have found a solution of the problem of how to give busy doctors post-graduate medical instruction without great expense or loss of time to them.

"The plan is briefly this: The University Extension Division, in co-operation with the Dean of the Medical School, serve in an organizing capacity. The best available instructor in the country is secured to give the course. Between ten and twenty physicians are assembled at five or six conveniently located towns accessible to the instructor on one day each week for twelve weeks. Each meeting consists of a one-hour lecture and from one to two hours of clinical work. Each group therefore receives a total of twelve lectures and twelve clinical demonstrations. The cost to each person is guaranteed to be not more than thirty dollars. Should the total receipts exceed the cost, the excess will be refunded pro rata.

"Post-graduate medical education is a necessity because of the rapid advancement in medical science. The average general practitioner cannot afford to be absent from his practice six weeks in order to take a course in residence at a cost of $400 or $500. What is now known as the 'North Carolina Plan' was inaugurated in the summer of 1916.

"Two instructors were appointed. Each was assigned to a circuit of six centers, which he covered in rotation every week for four months, a class thus being held in each city once a week. The classes were composed of physicians residing in these centers and their surrounding rural communities.

"The actual organization of the classes, and the planning of the instructors' routes and other executive work was carried out by the University Extension Division, while the more strictly medical problems, notably the selection of the instructors and the outline of the work, were in the hands of the Dean of the Medical School."

The experiment in these two and other states has been very successful. Your Committee believes that the profession of this state will welcome an opportunity to broaden its knowledge and to keep up with medical progress which some such plan will furnish at a minimum expenditure of time and at a reasoanble cost.

Therefore, your Committee recommends:

1. That the Committee on Medical Education and Hospitals be instructed to confer with Mr. Richard R. Price, Director of the Extension Division, and Dean Lyon of the Medical School, as to the feasibility of the scheme. (Mr. Price and Dean Lyon have expressed to the Committee their willingness to co-operate with the State Medical Society in every possible way.)
2. If found to be practicable to adopt a plan suitable to the peculiar conditions in Minnesota and
3. Subject to the approval of the Council to put the plan into effect in co-operation with the Director of the Extension Division and the Dean of the Medical School of the University of Minnesota.
4. Finally, your Committee believes that the plan can be made self-supporting, but it realizes that in inaugurating any new scheme there may be some incidental expenses necessary, we therefore recommend that a small appropriation be made to insure success.

Respectfully submitted,

A. R. Colvin,
E. S. Judd,
J. C. Litzenberg, Chairman.

COMMITTEE ON PUBLIC POLICY AND LEGISLATION

To the President and Members of the House of Delegates of the Minnesota State Medical Association.

Gentlemen: Owing to the fact that the Legislature of the State of Minnesota was not in session during 1924, the activities of your Committee on Public Policy and Legislation has been necessarily limited. We have co-operated with your Committee on Public Health and heartily endorse the recommendations made in their report.

During the sessions of the Legislature of the State of New York we received almost daily bulletins covering the activities of the Committee on Legislation of the Medical Society of the State of New York.

It would seem from these reports that this Society maintains an office at Albany and has a full time man covering the legislature during the entire session. Whether this is feasible in Minnesota or not your Committee does not know, but the subject is worthy of consideration. Telegrams were sent to Governor Smith and Senate Majority Leader James M. Walker at Albany, at the request of Dr. James M. Vanderveer, the Chairman of the Legislative Committee of the New York Society, in the name of this Association, urging the passage of bills relating to the practice of the cults.

A request was received from Dr. W. C. Woodward, Executive Secretary of the Bureau of Legal Medicine and Legislation, of the American Medical Association, request-

ing a transcript of the evidence in a suit brought to test the constitutionality of the Chiropractic law in Minnesota. Interviews with Judge H. D. Dickinson, of Minneapolis, before whom the case was heard, and with Attorney General Hilton, disclosed the fact that there was nothing of value in the evidence and Dr. Woodward was so informed.

Letters have been mailed to the chairmen of the Legislative committees of all County Societies, or to the Presidents or Secretaries of these component Societies, urging them to get in touch with the various aspirants for legislative honors and urge upon them the advisability of informing themselves on medical legislation and to point out to them before they are elected, the necessity for proper regulation of the practice of medicine and surgery.

It is recommended—first, that if possible a full time man be employed during the legislative session, and second, that if any definite legislation is desired by this Association it be formulated at this session and put before the prospective candidates.

COMMITTEE ON PUBLIC POLICY AND LEGISLATION.

THE STATE CANCER COMMITTEE

To the President and House of Delegates of the Minnesota State Medical Society:

Your Cancer Committee begs to submit the report of its activities during the past year.

A review of the discussion precipitated by the report of this Committee at the meeting of the House of Delegates on the first day of the State Society meeting in 1923 presents an interest in the subject of cancer control manifested for the first time. This discussion in itself has served as a stimulus to all members of the Committee to continue in behalf of the State Medical Society the conduct of the educational work as outlined and directed by the American Society for the Control of Cancer.

The constructive criticism offered after the presentation of the 1923 report has resulted in the coalition of the Cancer Committee of the State Medical Society and the State Cancer Committee of the American Society for the Control of Cancer, which enables the Committee to carry on the activities of cancer control under the direction of the State Medical Society. As a result, the activities of this Committee have been conducted in the past year with increasing harmony in the membership of the State Medical Society. As stated in previous reports, it has been the opinion of the State Cancer Committee that it could best serve the interests of the State Medical Society by co-operating with the American Society for the Control of Cancer in its educational campaigns.

The campaign, as outlined in previous years, was again conducted in Minnesota throughout the week of November eleventh to eighteenth in 1923. During that week statewide publicity was given the most salient facts about cancer, through the organization and activities of seventy-six County Cancer Committees. Through these organizations short talks were given, and literature, furnished by the National Society, was read before many audiences, including churches, fraternal organizations, clubs, et cetera. Thirty-one public meetings were held under the auspices of County and District Medical Societies. The newspapers throughout the state contributed liberally of space for articles dealing with the known facts about cancer, furnished by the National Society. Other activities consisted of five cancer clinics, two radio talks, the showing of the film "The Reward of Courage," and slides in many theaters.

Your Committee believes that educational work should continue and desires the co-operation of the individual members of the State Medical Society. Also, the Committee wishes to follow the suggestions of the House of Delegates in the conduct of its work.

We desire at this time to express our thanks and appreciation to the members of the State Medical Society who have been active in the educational campaigns, particularly those who have acted as County Chairmen, and those who have contributed their time and money in the presentation of public lectures.

Respectfully submitted,

VERNE C. HUNT (Chairman),
Minnesota State Cancer Committee.

REPORT OF THE STATEWIDE PUBLICITY COMMITTEE*

This Committee has been comparatively inactive during the past year.

"The Northwestern Health Journal," which was fostered by the Minnesota Public Health Association and this Committee, is prospering and has an ever increasing list of lay subscribers. The material in the Journal is very high class and is designed to reach the ordinary reading public.

"The Popular Health" is a new magazine now being published by the former editor of the Northwestern Health Journal, and is very much the same type of journal. It is at present in no way sponsored by any medical society or medical group, but the material is being submitted by the editor to various medical men, who are members of this society, and is uniformly good. The editor is anxious to have a committee from the State Association officially censor the material and the advertising in the magazine. This magazine is rapidly reaching a wide circulation,—the editor informs now something over 15,000. It has been sponsored by the dentists of the state to the extent that they are all subscribers, and the dental material is being carefully censored by a group of dentists.

Among other publicity activities of the Committee was the radio broadcasting program. After consultation with the president, Dr. MacLaren, and the counselors, an agreement was entered into with the Dayton Company for the broadcasting of a program of popular medical topics. The program was prepared and the topics were to be given out as under the auspices of the State Medical Society, naming also the County Medical Society of which the man who prepared the talk was a member. In our agreement with the Dayton Company, there were to be no names mentioned, the talk simply being sponsored by the State and County Societies. Owing to suspension of operation by the Dayton Company and the WLAG broadcasting station, the program was not carried out. The Committee would like to know, at this time, the sentiment of the Society on the propriety, the feasibility and value of such a broadcasting

*Inasmuch as this report has not been submitted to the individual members of the committee it is requested by its chairman that any objections or suggestions on the part of committee members be presented to the chairman prior to the meeting.

program. While no advances have been made, it is possible that the new, large broadcasting station, now in the process of construction by the Washburn-Crosby Company, could be induced to give us a place on their program. If the program had been carried out, as intended, the outlines for the various talks would have been submitted to the members of this Society throughout the state,—they being asked to write a popular article on the subject which would either be broadcast from the station by the author or a substitute when the author could not be present. The author's name would not be mentioned, but the article would be published in the state medical journals giving credit to the man who prepared the article.

The Committee was also interested with the Public Health Committee of this Society in promoting interest in the State Fair Health exhibitions. We believe by the showing of a little interest that the whole health program of the State Fair could be put under the auspices of the State Medical Society and the University Medical school, and that it would be a very fine form of publicity and public health work for the Society.

As the publicity work of the Society must largely be carried on under the guise of public health, there is an overlapping duplication in the existence of two committees such as we now have,—the Public Health Committee and the Statewide Publicity Committee. Therefore, it is the desire of the Statewide Publicity Committee that this Committee be discontinued as a separate committee and be continued as part of the Public Health Committee.

N. O. PEARCE, M.D.,
Chairman, Statewide Publicity Committee.

COMMITTEE ON PUBLIC HEALTH

In response to a letter from the chairman of the Statewide Publicity Committee, your committee on April 15, 1924, met with Dean Nicholson and the director of the University Public Health service and the vice president of the Hennepin County Medical Society, to investigate the Public Health Service of the University of Minnesota.

The following statements were made by representatives of the Public Health Service. About 60 per cent of the University students are putting themselves through college, either in whole or in part. Ninety per cent of those who report to the staff would probably not see any physician if it were not for the public health service.

The public health service refers a great many students together with their findings to their family physicians when they live in the Twin Cities, and their policy is to do this in those cases where they feel they are able to pay ordinary fees. They admit that the occasional case able to pay ordinary fees occasionally slips by them, but of what free institution is this not true?

In the judgment of your committee the great work they are doing is that of educating these young people to the value of regular examinations, to the value of reporting themselves early in case of sickness and, last but not least, the thousands of students are graduated educated to the value of regular medicine rather than being advocates of the cults.

As to the good accomplished among the student body there is no question. This is detailed in the April issue this year of MINNESOTA MEDICINE.

Your committee wishes to go on record as heartily indorsing the University Public Health Service.

For the first time the State Medical Association in conjunction with the University of Minnesota has put on a health exhibit at the State Fair. Dr. Wm. O'Brien of the Medical Department has had charge of the work and the medical association has paid the bills. The general scheme was outlined in the September issue of MINNESOTA MEDICINE.

At the 1923 session of the house of delegates, the committee on public health for this year was requested to gather information throughout the United States relative to the points of contact between the medical profession and the public. Forty-nine questionnaires were sent and thirty-three responded. Including Minnesota, we have statistics from thirty-four states.

No. 1. Does legislation initiated by the medical profession meet with a fair degree of co-operation in your state or the reverse?

Excellent, 6 per cent; good, 14 per cent; fair, 40 per cent; poor, 40 per cent.

No. 2. Are the medical men of your state organized into legislative committees with reference to proposed legislation?

In 9 states, special organizations; in 24 states, handled by the state committee; in 1 state, no organization.

No. 3. Does your State Association or public health agency publish a journal devoted to medical and public health matters for the laity?

Six states do this, including Minnesota, and one state has a tuberculosis journal.

No. 4. Does your State Association or any component medical society approve or conduct systematic radio talks?

Kentucky, Ohio, Washington (state), Pennsylvania and Wisconsin do this. Approval of the idea expressed by Georgia, Iowa, Texas, Nevada. Minnesota hopes to begin such a program this fall.

No. 5. Have you a public health league or similar organization which develops contact between the profession and the public?

Fifteen states have, including Minnesota.

No. 6. Have you a state hospital for medical and surgical cases and if not through what channels are the poor in your rural communities cared for?

Twelve, including Minnesota, answer yes. Sixteen provide community care only. Six have an insane hospital or none.

No. 7. Are your hospital facilities for indigent tuberculous cases ample?

Yes, 10; fair, 10; no. 10. No tuberculous cases requiring hospitals, 2.

No. 8. Grouping together osteopaths and chiropractors, what is their percentage to medical men?

Unknown, 7. The balance of the states run all the way from 3 per cent to 50 per cent in Wisconsin. In Minnesota the proportion is about 20 per cent.

No. 9. What are your state activities along the lines of child welfare?

Every state that answered is active in this line.

No. 10. Any other information showing points of contact between the medical profession and the public would be greatly appreciated.

Five states have lecture programs; one state offers occasional lectures, and one gives state clinics. Kentucky, Georgia and Wisconsin have systematic public press articles.

If we analyze conditions in Minnesota from the standpoint of contact between the medical profession and the laity we find some satisfactory conditions as well as the reverse. Co-operation on the part of the state legislature is very far from what we could desire. Local county society legislative committees were organized two to three years ago and should be continued. The committee on legislation of the state association is helpless without general co-operation throughout the state. These committees should be active in the pre-election period.

We find two lay journals in Minnesota devoted to public health matters—one published by the Minnesota Public Health Association—the Northwest Health Journal, with a subscription list of over 10,000. This journal deserves the support of every physician in the state and should be in every doctor's waiting room. The second journal is the Popular Health Magazine, which is privately owned and exists for private gain.

The Minnesota Public Health Association deserves more than passing comment.

In 1903, the Minnesota Anti-Tuberculosis Association was organized. In 1907 they had a paid executive secretary. In 1915 the name was changed to the Minnesota Public Health Association. It is financed entirely through the sale of Christmas seals and this income this year was over $100,000. Their activities include:

Clinics, tuberculosis, pediatrics and public health.

Tuberculosis clinics are conducted by county sanatoria men.

Pediatric clinics by specialists whose expenses are paid by the association. The public health clinic consists of a doctor and nurse who travel over the state in a Ford truck provided the counties have sold enough Christmas seals to pay expenses.

Four public health nurses were in the field this summer.

Health exhibits are loaned as occasion demands. They try and have them at local county fairs as well as at the state fair. They also send a health clown to these fairs.

Dr. Lochead will give health lectures anywhere in the state.

They distribute much public health literature free of charge. They publish at a loss the Northwestern Health Journal, with a circulation of over 10,000.

The matter of radio broadcasting in Minnesota on public health matters by the medical profession has been a storm center of discussion. The consensus of opinion is that the name of the speaker shall not be announced unless he is a full time teacher or public health worker and not engaged in the active practice of medicine. Your committee is convinced that to allow a relatively small number of active practitioners, whose names are announced over the radio, to broadcast public health talks, would create bad feeling and is not good policy. Five states or county societies broadcast public health talks and four states expressed approval of the plan. Your committee warmly endorses the plan if properly safeguarded. The two stations in Minneapolis have discontinued, but if either of them reopens, broadcasting will probably be done under the auspices of the State-wide Publicity Committee. There are in our state 128 nurses doing public health work exclusive of the Twin Cities and Duluth. There are forty-six county nurses and thirty-seven counties have no nurse. These nurses are paid by various agencies—the local county commissioners, school boards, Red Cross or Minnesota Public Health Association. Olmstead county has a county health nurse, infant welfare nurse, a county maternity nurse, and a school nurse.

Thirty-seven counties of the state support fourteen county tuberculosis sanatoria. This is in addition to Walker.

Minnesota is one of the twelve states out of thirty-four which are equipped to care for the indigent sick, both general and tuberculous.

Some interesting features of work along these lines have been worked out in other states. The Ohio public health association is the chief medium of contact between the profession and the laity. In addition, they have a public health federation including dentists, druggists, nurses, hospitals, the public health association and physicians.

In Kentucky the county medical societies work in close co-operation with the Bureau of Child Hygiene and the State Board of Health. All local clinics are under supervision of the county medical societies. The State Medical Association and the State Board of Health are closely co-ordinated. The State Health Officer is the Secretary of the State Medical Association, and therefore the state association guides the activities of the State Board of Health, which is the legal arm of the profession and is so recognized by the legislature and the public.

In Colorado the Denver City and County Medical Society conducts monthly public health lectures. They have a Colorado association for the protection of public health composed of many prominent laymen as well as doctors.

Massachusetts: "It is only a few months ago that our society first took up this matter of contact between the profession and the public and we have spent most of our time investigating the possibilities. So far we are depending upon lectures which we insist shall be constructive, not argumentative, and the block material for the county newspapers. We are making contact through parent-teachers' asociations, women's clubs, labor unions and any place where they may want a lecturer. Each district society is asked to hold an occasional meeting in their district."

In Georgia they have a statewide health association composed of the state chamber of commerce, bankers, railroads and the medical profession. Also a state health council composed of medical associations, Red Cross, the tuberculosis association, Kiwanians, Rotarians, women's clubs, state agricultural society and physical education association.

Texas: The medical profession is raising a considerable

sum of money for a publicity campaign in order to gain public and legislative support.

From a study of the answers received, one is impressed with the general recognition of the idea of the advisability of our profession developing contact with the public along public health lines. The basic underlying principle is to strive for an intelligent public viewpoint toward the medical profession.

Individual members of your committee have repeatedly had the idea of effort along these lines held up to ridicule by the high grade medical men. They say that we are not in a position to do anything as long as we harbor crooks and abortionists and ignorant doctors in our medical societies and allow them to practice medicine.

They say get rid of them first and we can present a clean front to the public and propaganda will not be necessary. Then they add, "How are we going to do it?"

Such types exist in all professions. Your committee believes that the same principle that governs in the acceptance of a life insurance applicant, namely, a confidential report on the moral hazard involved, should also govern in the selection of candidates by the medical schools—namely, a confidential report on character. Those who cannot measure up to established standards should be rejected.

However, if we allow the public to rate the entire medical profession by its relatively few crooks we commit a gross injustice to ourselves.

RECOMMENDATIONS

(1) That local committees on legislation be continued in every county society in the state.

(2) That local committees on public health in every county society take an active interest in all local public health matters.

(3) That radio broadcasting on public health matters be undertaken as soon as possible under the auspices of the statewide publicity committee—that such talks be announced as being given under the auspices of the Minnesota State Medical Association and the ———— County Medical Society, but that the name of the speaker shall not be announced if he is engaged in the active practice of medicine.

(4) That the Minnesota Public Health Association be asked to broaden the scope of their work to include the sending of selected articles on public health to the newspapers of the state at regular intervals and to obtain the newspapers' co-operation for their publication.

(5) That the association indorse the Northwestern Health Journal and permit the management to state that it is the official journal for the public of the Minnesota State Medical Association.

(6) That the Secretary of the Minnesota State Medical Association transmit to the Board of Regents of the University of Minnesota, the recommendation of their house of delegates that in addition to educational requirements to the medical school that the character of applicants for admission be ascertained by confidential reports and that those not measuring up to a proper standard be rejected.

(7) That the state medical association continue their part in the State Fair Public Health Exhibit.

COMMUNICATIONS

Kansas City, Mo.,
August 30, 1924.

DEAR EDITOR:

A nationwide movement for improved conditions in maternal welfare is being inaugurated through the combined efforts of a joint committee representing the American Gynecological Society, the American Child Health Association, and the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons.

An appeal is being made to the Secretaries of the State Medical Associations to enlist the co-operation of their members and also of the constituent County Medical Societies to stress the subject of obstetrics in the programs of their meetings and try to have more papers and discussions on the topics vital to this most essential branch of our work.

The reason for the propaganda is that recent statistics are published showing a deplorably high mortality in maternity work in our country. A Washington report gives the United States the unenviable position of third from the highest death rate in both sepsis and eclampsia among the seventeen civilized nations of the world. These two accidents are almost absolutely preventable. Among the reports from sections where pre-natal care is taught and where aseptic care observed in labor the mortality is reduced one-third to one-half the average in the same region.

So many other features, while not so tragic, demand reform in obstetrics that the committee hopes within five years that not only the mortality of mothers and children may be reduced just as the profession has cut down the death rate in typhoid fever, tuberculosis and diphtheria in recent decades; but also that obstetrics may be again placed on the plane with internal medicine and surgery, a dignity which it formerly occupied in the colleges and in the profession, as one of the three great branches of the healing art.

This is a work of education, and it demands the co-operation of teachers and specialists in obstetrics, general practitioners, nurses, and the general public, to accomplish so ambitious a program.

A copy of the Annual Report to the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons is sent under separate cover detailing some of the conditions found and showing the more hopeful outlook for the future.

(Signed)

FRED L. ADAIR, M.D., Minneapolis,
HENRY SCHWARZ, M. D., St. Louis,
ROBERT L. DENORMANDIE, M.D., Boston,
GEO. W. KOSMAK, M.D., New York,
FRANK W. LYNCH, M.D., San Francisco
RALPH W. LOBENSTINE, M.D., New York,
WM. CLARK DANFORTH, M.D., Evanston, Ill.
GEO. CLARK MOSHER, M.D., Kansas City, Mo.

OBITUARY

DR. JAMES B. WHITE

Dr. James B. White, of Belle Plaine, Minnesota, died at the age of 60 years at the Miller hospital, St. Paul, Saturday morning, August 30, 1924, following an illness of several weeks' duration.

James B. White was born in New York City on August 6th, 1864. When a child of three years his father died and shortly afterward the family moved to Belle Plaine. He grew to manhood in that locality and for a few terms taught school. He later entered the medical school at the University of Minnesota, from which institution he graduated in 1891. The same year he moved to Montgomery to practice medicine. He remained there until October, 1901, when he went to Faribault and specialized in surgery. In the spring of 1906 he again returned to Montgomery and followed his profession until February, 1912, when he returned to his early home in Belle Plaine.

He is survived by his wife, two sons, Robert, of Duluth, and Frank, of St. Paul, two sisters, Mrs. Dennis Connelly, of St. Thomas, and Mrs. H. B. Conlon, of Belle Plaine. Two stepbrothers, M. O'Brien, of Belle Plaine, and John O'Brien, of St. Paul, also survive.

The following tribute is paid Doctor White in the columns of a home paper:

"Doctor White was not only one of our leading physicians but was almost a native son, having come to Belle Plaine in his early childhood. He was widely known through Scott, LeSueur and Rice Counties. He stood high in his profession as a conscientious physician and high in the community as an exemplary citizen. During his practice of more than thirty years he alleviated pain for hundreds and stayed the approach of the Grim Reaper in many homes, yet was fated to go himself when little past the meridian of life. He was of that splendid type of country doctor that responded to every call to rich and poor alike, in every kind of weather, under every adverse condition."

DR. ROBERT H. MULLIN

Notice has been received of the death of Dr. Robert Hyndman Mullin, formerly Associate Professor of Pathology and Bacteriology, Medical School, University of Minnesota, and Director, Laboratory Division, Minnesota State Board of Health.

Dr. Mullin has resided in Vancouver, British Columbia, for several years. He was pathologist for Vancouver General Hospital and connected with the University of British Columbia.

Death was sudden, from cerebral hemorrhage, and occurred at his home, 821 Broughton Street, Friday, August 29, 1924.

DR. JOHN C. NELSON

Few men in our profession have enjoyed to such an extent the esteem, both of his professional brethren and the laity, as did Doctor John C. Nelson. Dr. Nelson was one of the most thorough and ardent Americans the writer has ever known. It was almost dangerous for one to laud this country's enemies or speak disparagingly of any of its institutions within his hearing. Although he was knighted by the King of Denmark for his efforts in behalf of the people from the land of his birth, this recognition should properly have come from us as all his efforts were bent toward educating these foreign born future citizens of the United States in the precepts of pure Americanism.

Dr. Nelson's life is a perfect example for a foreign-born boy landing on the shores of this country to follow. He was a well-educated competent physician, devoted to his work and a man who always had time to accept many times more than his share of the responsibility incumbent upon citizens of this nation and members of this community.

Dr. Nelson was born in Copenhagen in 1847. He came to this country when he was 18 years of age, with his brother and a boyhood chum. He had heard of a Danish settlement at Beloit, Wisconsin, and he came directly from New York to this community. He stayed there but a short time when he went to Fillmore county, Minnesota, working as a clerk in small villages and finally becoming a drug clerk in the town of Lanesboro, Fillmore county. While at this work he became interested in the practice of medicine and began his studies in the Keokuk Medical College. He came to St. Paul in 1879 where he began to practice. Dr. Nelson was coroner of Ramsey county during the years from 1896 to 1900, having served two terms. He had been Danish Vice Consul for this district for the 28 years previous to his death, which occurred March 3, 1924. He had been the examiner for the Aetna Life Insurance Company for 30 years previous to his death. About ten years ago he was knighted in the Order of Dannebrog by the King of Denmark for faithful and efficient service as Danish Vice Consul in this country. Before Dr. Nelson's death he was the second oldest Scottish Rite Mason in the State of Minnesota. He was a member of Damascus Commandery of the Knights Templar, and Osman Temple of the Shrine. He was the first president of the St. Paul Cycle Path Association and for many years was an ardent devotee of bicycling. He was also the first president of the St. Paul Garden Club and was one of our leading amateur authorities on horticulture.

Fifty-two years ago Dr. Nelson was married to Hansina Jensen. He is survived by his widow; three sons and one daughter, Dr. M. O. Nelson, Dr. Louis A. Nelson, Dr. Edgar E. Nelson, and Miss Anna Nelson.

H. B. ZIMMERMAN, M.D.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

MINNESOTA STATE MEDICAL MEETING

The annual meeting of the Minnesota State Medical Association will take place in St. Cloud, Wednesday, Thursday and Friday, October 8, 9 and 10, 1924. A program has been mailed to each member.

The Council meets at 10 A. M. and the House of Delegates at 2 P. M. on October 8, in the Knights of Columbus quarters adjoining the Breen Hotel. The second meeting of the House of Delegates will be on the second day, October 9, instead of on the last day of the convention, as formerly. All information can be obtained at the Breen Hotel, which is to be headquarters.

The scientific program begins Thursday, October 9, at 8:30 A. M., the Surgical section meeting in the Sherman Theatre and the Medical Section in the Knights of Columbus Hall, both adjoining the Breen Hotel. The General Sessions will meet in the Sherman Theatre each afternoon at 2 P. M.

Physicians are particularly urged to bring their ladies for the entertainment of whom special efforts have been made. Auto rides through the quarries and to the paper mills and State reformatory and opportunities for golf will be provided. The dance Thursday evening will hardly be a success unless the ladies attend. There will be no wall flowers at St. Cloud.

Dr. C. B. Lewis is general chairman of the local committees on arrangements.

Officers of the Association are:

President—Archibald MacLaren, M.D., St. Paul
First Vice President—E. T. Sanderson, M.D., Minneota
Second Vice President—F. J. Hirschboeck, M.D., Duluth
Third Vice President—C. W. Bray, M.D., Biwabik
Secretary—Carl B. Drake, M.D., St. Paul
Treasurer—F. L. Beckley, M.D., St. Paul

PROGRAM OF THE MINNESOTA STATE MEDICAL ASSOCIATION

Fifty-sixth Annual Session
October eighth to tenth
1924

THURSDAY MORNING—OCTOBER 9TH
8:30 A. M.

MEDICAL SECTION

E. L. TUOHY, M.D., Chairman
CHARLES N. HENSEL, M.D., Secretary
Knights of Columbus Hall

1. Differential Diagnosis of Pulmonary Disease — M. George Milan, M.D., Warren
   Discussion by George Douglas Head, M.D., Minneapolis; Walter J. Marcley, M.D., Minneapolis
2. Artificial Pneumothorax in Acute Lung Abscess—Everett K. Geer, M.D., St. Paul
   Discussion by W. S. Lemon, M.D., Rochester; J. N. Myers, M.D., Minneapolis
3. Liver Functional Studies in Clinical Jaundice—Carl Hartley Greene, M.D., Rochester
4. Liver Functional Studies in Experimental Jaundice—A. M. Snell, M.D., Rochester
   Discussion on both papers by Henry L. Ulrich, M.D., Minneapolis; Leonard G. Rowntree, M.D., Rochester; H. W. Walters, M.D., Rochester
5. Diabetes in Children—F. W. Schlutz, M.D., Chief Department of Pediatrics, University of Minnesota, Minneapolis
   Discussion by N. O. Pearce, M.D., Minneapolis; O. W. Rowe, M.D., Duluth
6. Practical Electrocardiography—Harold E. Richardson, M.D., St. Paul
7. The Electrocardiogram in the Management of Heart Disease—E. T. F. Richards, M.D., St. Paul
   Discussion by R. Edwin Morris, M.D., St. Paul; F. A. Willius, M.D., Rochester; M. H. Nathanson, M.D., Minneapolis

SURGICAL SECTION

A. C. STRACHAUER, M.D., Chairman
VERNE C. HUNT, M.D., Secretary
Sherman Theatre

1. The Treatment of Severe Injuries of the Scalp—Orville N. Meland, M.D., Warren
   Discussion by A. W. Adson, M.D., Rochester; W. L. Burnap, M.D., Fergus Falls; A. A. Law, M.D., Minneapolis.
2. Obstructive Jaundice and Studies in Liver Function—H. Waltman Walters, M.D., Rochester
   Discussion by A. L. Cameron, M.D., Minneapolis; A. C. Strachauer, M.D., Minneapolis; A. A. Zierold, M.D., Minneapolis
3. Foreign Proteins as Therapeutic Agents in the Treatment of Acute Ocular Inflammation — John F. Fulton, M.D., St. Paul
   Discussion by Paul Berrisford, M.D., St. Paul; W. L. Benedict, M.D., Rochester; W. R. Murray, M.D., Minneapolis; Carl Larsen, M.D., St. Paul
4. Preoperative Treatment of the Prostatic—Gilbert J. Thomas, M.D., Minneapolis
   Discussion by H. C. Bumpus, M.D., Rochester; Oscar Owre, M.D., Minneapolis; Edward Bratrud, M.D., Warren
5. Acute Osteomyelitis in Children—Carl C. Chatterton, M.D., St. Paul
   Discussion by M. H. Tibbetts, M.D., Duluth; H. T. Jones, M.D., Rochester; P. W. Giessler, M.D., Minneapolis; C. A. Reed, M.D., Minneapolis
6. Perforating Gastric Ulcer—P. E. Stangl, M.D., St. Cloud
   Discussion by H. C. Cooney, M.D., Princeton; H. B. Zimmerman, M.D., St Paul; C. H. Mayo, M.D., Rochester; E. M. Jones, M.D., St. Paul
7. Consideration of Various Abdominal Symptoms and Findings in Diagnosis—William R. Bagley, M.D., Duluth
   Discussion by J. P. Schneider, M.D., Minneapolis; J. A. Johnson, M.D., Minneapolis; Robert Earl, M.D., St. Paul

THURSDAY AFTERNOON—OCTOBER 9TH
2:00 P. M
General Session
Sherman Theatre
CANCER SYMPOSIUM

1. Carcinomata as Shown by Paper Models Reconstructed From Serial Section—Margaret Warwick, M.D., St. Paul
2. Some Unusual Pathologic Features Concerning Cancer—Harold Robertson, M.D., Rochester
3. The Destructive and Constructive Surgery of Malignancy—Harry P. Ritchie, M.D., St. Paul
4. The Relative Value of Surgery and Radiotherapy—William J. Mayo, M.D., Rochester
5. What the Laity Should Know About Cancer—William A. O'Brien, M.D., Minneapolis

---

FRIDAY MORNING—OCTOBER 10TH
8:30 A. M.
MEDICAL SECTION
Knights of Columbus Hall

1. Amebiasis—T. B. Tuttle, M.D., Veterans' Bureau
   Discussion by A. J. Chesley, M.D., State Board of Health; W. L. Pollock, M.D., Rochester; Margaret Warwick, M.D., St. Paul
2. Hemorrhagic Purpura—H. Z. Giffin, M.D., Rochester
   Discussion by S. Marx White, M.D., Minneapolis; J. P. Schneider, M.D., Minneapolis
3. Some Observations Concerning Tic Douloureux After Sixteen Years' Experience—Charles R. Ball, M.D., St. Paul
   Discussion by A. S. Hamilton, M.D., Minneapolis; J. C. Michael, M.D., Minneapolis
4. The Role of Infections in Nervous Disease—W. H. Hengstler, M.D., St. Paul
   Discussion by Henry W. Woltmann, M.D., Rochester; A. S. Hamilton, M.D., Minneapolis
5. Diathermy in Vascular Circulatory Disturbances and Arthritis—A. E. Flagstad, M.D., St. Paul
   Discussion by P. G. Boman, M.D., Duluth; G. S. Wattam, Warren; G. E. Brown, M.D., Rochester
6. Cutaneous Picture of Late Syphilis—Paul A. O'Leary, M.D., Rochester
   Discussion by S. Sweitzer, M.D., Minneapolis; A. H. Schwartz, M.D., Duluth
7. Diseases of the Pancreas; Discussion of the Important Symptoms and Findings with Report of Cases—Moses Barron, M.D., Minneapolis
   Discussion by George Douglas Head, M.D., Minneapolis

SURGICAL SECTION
Sherman Theatre

1. The Silent Antrum—W. L. Burnap, M.D., Fergus Falls
   Discussion by H. I. Lillie, M.D., Rochester; Horace Newhart, M.D., Minneapolis; J. D. Lewis, M.D., Minneapolis; J. T. Schlesselman, M.D., Mankato
2. Surgical Accidents in Simple Inguinal Hernioplasty—Emil C. Robitshek, M.D., Minneapolis
   Discussion by J. C. Masson, M.D., Rochester; G. G. Eitel, M.D., Minneapolis; Gustav Schwyzer, M.D., Minneapolis; A. R. Colvin, M.D., St. Paul
3. Arthroplasties—M. S. Henderson, M.D., Rochester
   Discussion by Emil Geist, M.D., Minneapolis; Wallace Cole, M.D., St. Paul; C. C. Chatterton, M.D., St. Paul
4. Fractures of the Spine—Emil F. Geist, M.D., Minneapolis
   Discussion by M. S. Henderson, M.D., Rochester; C. B. Lewis, M.D., St. Cloud; A. E. Wilcox, M.D., Minneapolis; C. A. Reed, M.D., Minneapolis
5. Relative Merits of the Different Surgical Procedures for Duodenal Ulcer—D. C. Balfour, M.D., Rochester
   Discussion by A. C. Strachauer, M.D., Minneapolis; H. P. Ritchie, M.D., St. Paul; A. T. Mann, M.D., Minneapolis; T. L. Chapman, M.D., Duluth
6. Tracing Infections in a Surgical Service—Arthur N. Collins, M.D., and Fred Ritz, Bacteriologist, Duluth
   Discussion by Walter E. Sistrunk, M.D., Rochester; William C. Carroll, M.D., St. Paul; A. C. Baker, M.D., Fergus Falls
7. Anesthesia in Goiter Operations at the Schmieden Clinic—C. Alexander Hellwig, M.D., St. Cloud (temporarily), Frankfort-am-Main, Germany

---

FRIDAY AFTERNOON—OCTOBER 10TH
2 P. M.
General Session
Sherman Theatre

1. Installation of Officers
2. The Behavior of the Testes Under Varying Experimental Conditions and the Function of the Scrotum: Transplantation Cryptorchidism and Vasectomy—Carl R. Moore, M.D., Department of Zoology, University of Chicago, Chicago, Illinois
3. Child Guidance—Lawson G. Lowrey, M.D., Minneapolis
4. Routine Examination of the New-born—O. W. Rowe, M.D., Duluth
   Discussion by F. C. Rodda, M.D., Minneapolis; Walter R. Ramsey, M.D., St. Paul
5. Differential Diagnosis of the Pre-eclamptic Toxemias and Nephritic Toxemias of Pregnancy—Albert G. Schulze, M.D., St. Paul
   Discussion by J. C. Litzenberg, M.D., Minneapolis; W. A. Coventry, M.D., Duluth
6. Periodic Physical Examinations—Henry Wireman Cook, M.D., Minneapolis
   Discussion by C. H. Mayo, M.D., Rochester; C. N. McCloud, M.D., St. Paul
7. Health Movie

LYMANHURST AND PARKVIEW STAFF MEETING

The regular monthly meeting of the Lymanhurst and Parkview medical staffs will be held at Lymanhurst School, 1800 Chicago Avenue, Minneapolis, Tuesday evening, October 28, at 7:00 o'clock.

Following is the program for the evening:

"Recent Literature on Tuberculosis in Infancy and Childhood," Dr. David M. Siperstein.

"Types of Tuberculosis at Different Ages," Dr. C. A. Stewart.

"Biological Tests in Infancy and Childhood," Dr. Cecile Moriarty.

"Bronchiectasis in Childhood," Dr. R. W. Morse and Dr. H. Lippman.

All persons interested in tuberculosis are invited to attend these meetings and participate in the discussions.

MINNESOTA ACADEMY OF MEDICINE

Meeting of Sept. 10, 1924

The Minnesota Academy of Medicine held its annual meeting at the Town and Country Club on Wednesday evening, September 10, at 8 P. M. The meeting was called to order by the President, Dr. A. S. Hamilton. There were 27 members present.

The minutes of the May meeting were read and approved.

The annual reports of the Secretary and Treasurer were read and accepted.

The annual election was held and the following officers were elected:

President—Harry P. Ritchie, M.D., St. Paul
Vice President—Henry L. Ulrich, M.D., Minneapolis
Secretary-Treasurer—John Eldon Hynes, M.D., Minneapolis (re-elected)

Dr. John F. Fulton, first president of the Academy, and Dr. S. Marx White, escorted the newly elected president to the Chair.

The retiring President, Dr. Hamilton, then read his President's address, entitled "Historical Survey of the Academy of Medicine."

The meeting adjourned.

John E. Hynes,
Secretary.

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

At the twenty-ninth annual meeting of the American Academy of Ophthalmology and Otolaryngology, held in Montreal, September 15 to 20, Dr. Horace Newhart, of Minneapolis, was elected president. The following Northwestern Fellows were present: From Minneapolis, Dr. Howard S. Clark, Dr. Wm. R. Murray, Dr. Horace Newhart, Dr. John A. Pratt, Dr. James S. Reynolds; from St. Paul, Dr. H. W. Grant; from Hibbing, Dr. W. E. Morsman; from Rochester, Dr. W. L. Benedict and Dr. Burt E. Hempstead; from Aberdeen, S. D., Dr. Robt. D. Alway, and Dr. A. E. Johnson from Watertown, S. D.

Dr. Carl C. Wold, of St. Paul, was elected a Fellow, and Dr. E. J. Brown, of Minneapolis, was made a Life Fellow. The next meeting will be held in Chicago.

OF GENERAL INTEREST

Dr. H. B. Aitkens, Le Sueur Center, spent the month of September in northern Wisconsin.

Dr. Joseph F. Borg has opened offices at 636 Lowry Bldg., St. Paul, for the practice of medicine.

Dr. Josephine Tofte has moved from Minneapolis to Fisher, where she was formerly located.

Dr. D. R. Hastings of Duluth has recently moved to Oak Terrace for the practice of his profession.

Dr. Walter G. Benjamin, formerly with the Mayo Clinic, Rochester, is now located at Pipestone, Minn.

Dr. F. G. Hedenstrom has opened offices at 218 Lowry Bldg., St. Paul, for the practice of his specialty, Pediatrics.

Dr. Karl E. Kretzchmar, formerly of Minneapolis, has located in Los Angeles, Cal., for the practice of his profession.

Dr. E. Eric Larson of the Mayo Clinic, Rochester, is now associated in practice with the Woodland Clinic, Woodland, Cal.

Dr. L. A. Calkins has moved from Minneapolis to Charlottesville, Virginia, where he is associated with the University of Virginia.

Dr. Leo G. Rigler, Minneapolis, is now in the East where he is taking a course in advanced work in Roentgenology. Dr. Rigler expects to return to Minneapolis the first of next year.

Dr. Clyde E. Gray, formerly of Rush City, is now associated in practice with Dr. G. M. Edwards, Denver, Colorado. Dr. Gray disposed of his practice at Rush City to Dr. A. E. Holmes last spring, following which he took up post-graduate work in surgery in Chicago and New York. Dr. Gray had practiced in Rush City for the past eighteen years.

The thirty-seventh annual meeting of the North Dakota State Medical Association was held in Bismarck, September 10 and 11, 1924. Among the visitors from Minnesota who took part in the program were Drs. Theodore Bratrud, E. L. Tuohy, E. S. Judd, W. R. Ramsey, W. A. Jones and S. G. Sweitzer.

Reports indicate that Syracuse, N. Y., is having more than its share of infantile paralysis this summer. Six cases were reported in June and thirty-two in July. It is interesting to note that the intial cases were among Italian children, as was the case in the 1916 epidemic in New York City and the 1921 epidemic in Utica.

A recent survey made by a group of University of Minnesota students of 309 households showed that 40 to 48 per cent of the members read the health news published by newspapers and that about half of them follow the health instructions. About 25 per cent of the households studied were those of mechanics and laborers.

Exercises for the laying of the cornerstones of Todd Memorial Hospital and the Cancer Institute on the University Campus, Minneapolis, were held at 2 P. M., Wednesday, October 1, 1924. President Coffman, of the university, presided and addresses were delivered by Dr. Arthur Dean Beban, of Chicago, and Dr. Edward L. Tuohy, Duluth.

Alumni of the University Medical College, Kansas City, Mo., will hold a reunion banquet, Wednesday, October 15, 1924, at 6:30 P. M. in the banquet room of the Kansas City Athletic Club, 11th and Baltimore, Kansas City, Mo. Fur-

ing the noon hour of the same day the various classes from 1882 to 1913 inclusive will hold individual class reunion luncheons. The reunion banquet is a part of the program of the Kansas City Clinical Society, which will convene in Convention Hall, Kansas City, Mo., October 13 to 18, 1924.

In recognition of the far-reaching developments of bronchoscopy in the diagnosis and treatment of diseases of the lungs and of esophagoscopy and gastroscopy in the diagnosis and treatment of diseases of the esophagus and stomach, the Board of Trustees and Faculty of the Jefferson Medical College have created a new chair, to be known as the Department of Bronchoscopy and Esophagoscopy. Dr. Chevalier Jackson, formerly Professor of Laryngology in the Jefferson Medical College, has been elected to the professorship of the new department. Dr. Fielding O. Lewis has been elected to fill the Chair of Laryngology vacated by Dr. Jackson.

NEW AND NON-OFFICIAL REMEDIES

The following have been accepted by the Council on Pharmacy and Chemistry:

COLEMAN AND BELL COMPANY:
Gentian Violet Improved Medicinal

HYNSON, WESTCOTT AND DUNNING:
Meroxyl
Meroxyl Tablets-H. W. and D.

JENSEN-SALSBERY LABORATORIES:
Rabies Vaccine (Human) Phenol Killed

ELI LILLY AND COMPANY:
Oridine
Oridine Tablets

H. A. METZ LABORATORIES:
Silver-Salvarsan, 0.6 gm. ampules

NATIONAL ANILINE AND CHEMICAL COMPANY:
Gentian Violet Medicinal-"National"

PARKE, DAVIS AND COMPANY:
Diphtheria Toxin-Antitoxin Mixture, 0.1 L+-P. D. and Co.

E. R. SQUIBB AND SONS:
Antistreptococcic Serum-Squibb, packages one 10 cc. syringe
Antistreptococcic Serum-Squibb, packages one 50 cc. vial
Antistreptococcic Serum Rheumatic-Squibb, packages one 20 cc. vial
Antistreptococcic Serum Rheumatic-Squibb, packages one 50 cc. vial
Diphtheria Toxin Antitoxin Mixture (New Formula), packages thirty 1 cc. ampules
Sulpharsphenamine-Squibb, 1 gm. ampules
Sulpharsphenamine-Squibb, 3 gm. ampules

FREDERICK STEARNS AND COMPANY:
Insulin-Stearns Quadruple Strength

WILSON LABORATORIES:
Ampules Pituitary Solution-Wilson, 0.5 cc.

NONPROPRIETARY ARTICLES:
Thiosinamine
Gentian Violet Medicinal

NEW AND NON-OFFICIAL REMEDIES

Holocaine Ointment-M. E. S. Co.—Composed of holocaine (see New and Non-official Remedies, 1924, p. 35) 1 per cent, water 1 per cent, wool fat and petrolatum 98 per cent. Put up in collapsible tubes for application to the eye. Manhattan Eye Salve Co., Louisville, Ky. (Jour. A. M. A., Aug. 2, 1924, p. 357.)

Silver-Salvarsan, 0.6 Gm. Ampules.—Each ampule contains silver-salvarsan (see New and Non-official Remedies, 1924, p. 54) 0.6 gm. H. A. Metz Laboratories, New York.

Diphtheria Toxin-Antitoxin Mixture 0.1 L+.—A diphtheria toxin-antitoxin mixture (see New and Non-official Remedies, 1924, p. 299), each cc. representing 0.1 L+ dose, of diphtheria toxin, neutralized with the required amount of antitoxin. It is marketed in packages of three bulbs, each containing 1 cc.; also in vials containing 20 cc. Parke, Davis and Co., Detroit. (Jour. A. M. A., Aug. 16, 1924, p. 508.)

PROPAGANDA FOR REFORM

Camphor in Oil in Heart Failure.—Marvin and Soifer have studied the effects of camphor in oil as a cardiac stimulant. They failed to secure evidence of any action on heart rate, respiration, blood pressure, vital capacity or the general clinical condition in which digitalis is frequently promptly effective. Henceforth, the burden of proof that camphor in oil has a rational place in the treatment of congestive heart failure rests with its advocates. All others may well hesitate to place their trust in a drug that seems to have given more promises than therapeutic performances. (Jour. A. M. A., August 2, 1924, p. 362.)

More Misbranded Nostrums.—The following products have been the subject of prosecution by the federal authorities charged with the enforcement of the Food and Drugs Act: DeWitt's Kidney and Bladder Pills (E. C. DeWitt and Co.), consisting essentially of methylene blue, potassium nitrate and plant material, including a volatile oil such as juniper oil. Foster's Backache Kidney Pills (Porto Rico Drug Co.), consisting of potassium nitrate, rosin, fenugreek, uva ursi and an essential oil such as juniper. Glycofostina (Henry S. Wampole Co., Baltimore), consisting essentially of strychnin sulphate, sodium calcium and potassium glycerophosphate, alcohol and water. (Jour. A. M. A., Aug. 2, 1924, p. 375.)

Rectal Administration of Digitalis.—Digitalis is absorbed rapidly and fairly uniformly from the alimentary tract of man, although some substances in the digitalis group, notably strophanthus products, are unsuited for oral administration. However, nausea, vomiting or surgical operations may sometimes interfere with the use of digitalis by mouth. For such emergencies digitalis may be satisfactorily administered by rectum. In many patients with auricular fibrilation, the results have been rapid and beneficial. Rectal digitalis therapy is not intended to supplant the well-established oral method of administration, but rather to be used as an emergency measure when the customary mode of introduction is not feasible. (Jour. A. M. A., Aug. 9, 1924, p. 446.)

Anaphylactoid Phenomena and Modern Therapy.—Anaphylaxis is that state of hypersusceptibility to a given substance which has been induced by a previous injection of the same substance. The reaction is limited to substances of a protein nature. A considerable variety of chemically

unrelated substances may produce "anaphylactoid" symptoms after intravenous injection by virtue of their causing occlusion of the pulmonary capillaries by thrombosis or by agglutinated corpuscles or platelets. Some of the substances which may produce anaphylactoid phenomena have been widely proposed for intravenous therapy, including a variety of "colloidal" solutions of iron, mercury, arsenic, antimony and protein, as well as extracts of animal tissues. In consideration of the possibility of anaphylactoid reactions being induced by such substances, it is well to reiterate that there seems to be little, if any, justification for the intravenous administration of such agents as hexamethylenamin, sodium iodid, and sodium salicylate, because their systemic effects are readily obtained by oral administration. (Jour. A. M. A., Aug. 23, 1924, p. 614.)

Scarlet Fever Toxin.—Scarlet fever toxin has been furnished by the John McCormick Institute to some city and state health departments. Physicians inquiring for this material should apply to their local health department. There is an increasing demand for standardized toxin that the Drs. Dick believe should be met; however, because the toxin must be standardized on human beings, the commercial companies are going to find it difficult to standardize accurately. (Jour. A. M. A., Aug. 30, 1924, p. 705.)

Chlorin Inhalations in Respiratory Affections.—Numerous devices have been advanced for the inhalation of chlorin gas. Several municipal health departments have installed treatment chambers where such devices are undergoing extensive experimentation. It is impossible to say if the virtues of the method have been demonstrated, and it must be considered in an experimental stage. The indications are that chlorin inhalations will not produce bacterial sterilization of the mucous membrane, although they seem to reduce the number of bacteria found on the tissues. The duration of an adequate treatment, the concentration of gas to be used, the methods by which the gas is to be produced, and similar factors are still the subject of experimentation. (Jour. A. M. A., Aug. 30, 1924, p. 691.)

Fatal Anaphylaxis From Hemostatic Preparations.—Recently a death was reported which was caused by the injection of a hemostatic preparation. It was discovered afterwards that the patient was a sufferer from asthma and that the attacks were elicited even by the mere approach of a horse. Because of the importance of determining the anaphylactic possibilities of the various blood coagulants, the Council on Pharmacy and Chemistry had specimens of the following preparations examined: Coagulen-Ciba, Fibrogen-Merrell, Hemagulen-Lilly, Kephalin-Armour, Hemostatic Serum Lapenta (Hemoplastin) ?P. D. and Co., Thromboplastin-Lederle, Thromboplastin-Squibb, Thromboplastin Hypodermic-Squibb, Thromboplastin Solution-Armour, Precipitated Horse Serium (Coagulose)-P. D. and Co. It was found that all of the specimens contained animal protein (in most cases horse or beef protein was present). In most cases the labels and descriptive literature did not state the precise nature of the coagulant. Since blood coagulants are usually administered as an emergency measure, physicians may overlook the danger and introduce these foreign proteins into a hypersensitive person. The Council recommends that all hemoplastic preparations be labeled to show the composition of the product, the character of the protein present, and to contain information which will cause the physician to inquire into the patient's history to learn if hypersensitivity exists. (Jour. A. M. A., Aug. 30, 1924, p. 705.)

CASE REPORTS

Members are requested to report interesting and unusual cases for publication in this department. Many cases reported at hospital staff meetings and similar meetings are very instructive and worthy of publication.

PREGNANCY WITH COMPLICATIONS: CHRONIC APPENDICITIS; LOW ANTERIOR IMPLANTATION OF PLACENTA; DOUBLE FOOTLING BREECH PRESENTATION; FORCEPS ON THE AFTER-COMING HEAD; HIGH POSTERIOR SECOND DEGREE LACERATION WITH SECOND DEGREE LEFT LATERAL EPISIOTOMY.

DANIEL H. BESSESEN, M.D.,
Minneapolis

The patient, aged 25, was first seen on October 29, 1923, complaining of scanty menses occurring at irregular periods and constipation with pains in the lower right quadrant. The family and social histories were without importance in this case. She had never been pregnant. On Dec. 11, 1923, the nausea and vomiting were worse, and pains of knife-like character were felt in the lower right quadrant, with distinct tenderness over McBurney's point. On pelvic examination the uterus was found enlarged and the diagnosis of pregnancy with chronic appendicitis was made. Operation was advised, and on December 13, 1923, an adherent appendix was removed. Convalescence was without special note and marked improvement in the patient's general condition was the result. Nothing further occurred of importance until at delivery, on June 1, 1924, when the patient suffered from slightly prolonged first and second stages of labor. Twins were suspected in this case because of the presence in the pelvis of a mass first taken to be a head, but later found to be the placenta. After dilatation was complete, the progress still being slow, the patient was put under complete anesthesia and an effort made to push the mass into the abdomen. The feet of the fetus were grasped, brought down and breech delivery done with the exception of the head. Here such difficulty was encountered in extracting the child, that forceps were applied, a left lateral incision in the perineum made and the head delivered. The release was so sudden that a high posterior second degree laceration of the perineum occurred in addition to the episiotomy. The repair healed per primam.

Appendicitis in pregnancy is of fairly frequent occurrence. It has been observed in general that operations on pregnant women, if done carefully and gently, are not inducive to abortion. It is well to advise according to the individual case.

A low anterior implantation of the placenta is not a common occurrence and when it does occur, it is sometimes of serious import. It frequently leads to early dislodging of the fetal circulation with resulting asphyxiation of the child. When necessary to completely separate the placenta, much speed is required, and often Dühusen incisions into the uterus are of value in securing rapid dilatation.

In applying forceps on the after-coming head, either the assistant my hold the child, or the body of the fetus may be laid on the abdomen of the mother. This facilitates the application.

In the case just cited, the forced required to extract the head, led to the posterior laceration additional to the episiotomy. It occupied all of six minutes from the time of the delivery of the umbilicus to the time of the delivery of the head, so that a white baby was born, resuscitated by hot and cold water baths and by abdominal compression for artificial respiration. Both mother and child recovered nicely.

PROGRESS

Abstracts to be submitted to Section Supervisors.

Members are urged to abstract valuable articles which they run across in their reading and send the abstracts to the physicians in charge of the respective sections. In order to avoid duplication it would be well to communicate with one of the section supervisors before the article is abstracted.

MEDICINE

SUPERVISORS:
F. J. HIRSCHBOECK,
FIDELITY BLDG., DULUTH
THOMAS A. PEPPARD,
LA SALLE BLDG., MINNEAPOLIS

ON THE MECHANISM OF RESPIRATORY TRACT INFECTION: Arthur L. Blomfield, M.D. (Tubercle [London] 1924, v, 438). In this article, Professor Blomfield, of Johns Hopkins University, sums up a series of studies on the behavior of bacteria in the upper air passages. Tradition has imposed on us the idea that the mouth is a specially favorable situation for bacterial growth, but certain objections can immediately be brought against this idea.

In the first place, the flora on the whole is remarkably constant from day to day and week to week, despite the miscellaneous horde of germs which are constantly introduced with food, fingers, and foreign objects.

Secondly, certain bacteria, such as Bacillus Coli, which are especially hardy and not at all capricious in their test tube requirements, are practically never found in the mouth and the chromogens of the air are almost unknown in the respiratory tract.

The series of experiments reported by Dr. Blomfield were undertaken in an attempt to throw light on this problem. Solid masses of bacterial growth from Agar slants were implanted on the tongue, the pharynx, the nasal septum, and the tonsil crypts of volunteers. The subjects were healthy people with clinically normal upper air passages.

The species studied were: B-Coli, Staphylococcus albus, B-Influenza, B-Friedlander, and Streptococcus hemolyticus. The one hour cultures uniformly yielded great numbers of bacteria, after two hours relatively few were obtained, and within twenty-four hours practically all had disappeared. (In the case of the tonsil crypts, a few organisms occasionally persisted for several days.)

A variety of possibilities suggested themselves by way of explanation of this phenomenon, but it seemed most likely that the flushing of the mouth secretions together with the contractions of the muscular masses of the tongue and pharynx were most important.

There exists in the mouth a highly organized mechanism by which foreign particles and bacteria are eliminated. A similar rapid elimination of bacteria from the nasal passages occurs, but here the sweep of the cilia must be the main factor in the mechanism. In addition to the mechanism described, there are other antagonistic factors. The saliva is probably an unfavorable medium for growth of most pathogenic bacteria. The bacteria normally present may exercise some opposition to the colonization of foreign bacteria. Certain groups of mucus-organism normally thrive in the mucous membranes of the upper air passages, especially hemolytic streptococcus. The dosage of bacteria and their degree of vegetative activity affect the results of implantation. Infection with meningococcus increased to nearly eighty per cent when the spacing between beds in the British Army was in one instance reduced from three to one and a half feet.

Perhaps the most important group of causes which promote bacterial invasion through the upper air passages are injuries of various kinds. Peripheral chilling (cold) is one of these, chemical injury is another, and anesthesia another; but infectious diseases, especially the so-called exanthemata, par excellence let down the bars for infection of the respiratory tract. Measles and influenza are outstanding examples, both producing local erythema.

With these considerations in mind, it may be questioned whether every tubercle bacillus which enters the nose or mouth regardless of source actually invades or even threatens invasion.

ARTHUR T. LAIRD.

PEDIATRICS

SUPERVISORS:
CHESTER A. STEWART,
LA SALLE BLDG., MINNEAPOLIS
ROY N. ANDREWS,
MANKATO CLINIC, MANKATO

ERFAHRUNGEN MIT DUBO: Dr. van Mallinckrodt (Monatschr. f. Kinderh., Bd. 27, Jan., 1923, pp. 438-441). The author thinks that Dubo is especially suited as a complemental feeding in weak infants that refuse large amounts of food. He finds its high calorie value of great importance in bottle-fed babies with impaired digestive function. However, he finds that Dubo is contraindicated when any parenteral infection accompanied by vomiting sets in—due to the danger of exsiccation. Dubo is easily and simply prepared and can be used in the home.

DAVID SIPERSTEIN.

DEHYDRATION: Owen H. Wilson, M.D. (Arch. of Ped., Feb., 1924). In young children the chief source of

water is in milk, which is nearly 90 per cent water, a normal year-old requiring at least 40 ounces of milk daily. In many acute illnesses, food (milk) is discontinued, or, as in the case at hand, is refused, and consequently dehydration is imminent. This is especially true of infectious diarrhea with its excessive fluid drain. This excessive drainage depletes the body fluids, causing the parched mouth, the drawn expression, the sunken eyes, and the dry, parchment-like skin and feeble, thready pulse. Most of the serious complications of infectious diarrhea are traceable to dehydration. When milk is refused or discontinued, the water supply is practically stopped. A sick baby requires as much or more water than a well one. If possible, it may be best to give specified quantities at stated intervals, though this rarely succeeds, and little harm is done by giving fluid at any time the patient will take it. If vomiting continuously, we must resort to intravenous, intraperitoneal, or subcutaneous methods. Giving fluid by the bowel is rarely successful in babies and must not be relied upon. The following method has been used by me for several years. The patient, in a recumbent position, is wrapped in a sheet, the head being steadied by an assistant. A teaspoon is introduced into the mouth, leaving about one-fourth of the bowl protruding beyond the teeth. The curved bowl prevents the teeth or gums from closing, and is far enough into the mouth to prevent the tongue from being pushed up against the roof of the mouth, and obstructing the fluid. Now pour the liquid into the projecting fourth of the bowl with another spoon, or better with a bottle. The fluid fills the pharynx and must be swallowed before breathing is possible. This method would not be advised in a comatose baby, in infants under one month of age, in whooping-cough, or when there is laryngeal paralysis. It is a most excellent way to give castor oil to a refractory patient. Remember in treating a sick baby he must have his daily quart.

R. N. Andrews.

COLIC IN BREAST-FED INFANTS AS A RESULT OF SENSITIZATION TO FOODS IN THE MOTHER'S DIETARY: W. Ray Shannon (Arch. of Ped., December, 1921). For some time it has been held that the diet of the mother could not affect a breast-fed infant. Shannon, in a previous paper, has shown, however, that food taken by the mother may appear in the breast milk and give rise to ana-phylactic reactions in the infants. These reactions may affect the skin, respiratory or the gastro-intestinal system.

He cites six cases of colic in infants due to such reactions. In each case skin tests were done on the infant with foods from the mother's dietary and positive results obtained. The removal of the offending foods caused the disappearance of the colic. In each of these cases egg was one of the foods which caused the trouble; it is noted that egg protein has been responsible for some of the manifestations of exudative diathesis in artificially-fed children.

It is concluded that the food allergy demonstrated in these cases is a reasonable basis for explanation of the old statement, "that all breast milk is not the best food for every baby."

A. M. Snell.

ENZEPHALOGRAPHE IM SAUGLINGSALTER: Knoepfelmacher (Jahrbuch f. Kinderheilkunde, March 5, 1924, pp. 181-187). Knoepfelmacher recommends encephalography as a valuable diagnostic procedure in infancy. He removes small amounts of cerebrospinal fluid through a ventricular puncture and injects an equal amount of air into the ventricle. He thinks that this technique enables one to make a definite diagnosis of hydrocephalus. He also considers it an aid in the diagnosis and localization of brain abscesses.

David Siperstein.

MENINGOCOCCUS MENINGITIS: (Archivos Españoles de Pediatríc, Madrid, Nov., 1923), (Arch. of Ped., May, 1924). The vascular communication with the ear in very young children explains the frequency of meningitis in connection with otitis. The otitis is often metastasis of meningococcemia. With headache, vomiting and fever, followed by signs indicating muscular hypertonicity (Kernig, etc.) lumbar puncture is imperative, and serotherapy should be continued with large doses until the meningococci have definitely disappeared. The spinal fluid may show 3 gm. of albumin and 54 cells per cubic millimeter, as in one convalescent recently, but this alone does not call for continuation of the antiserum. Parallel lumbar puncture and injection of saline in some healthy children showed up to 2 gm. albumin and 40 or 50 cells. One child died the eighty-fourth day, and meningococci were found in the fluid. Serotherapy had been discontinued a month before. González Alvarez reiterates the warning that the throat of all contacts must be disinfected, and serotherapy must be pushed with larger doses than those generally used.

R. N. Andrews.

ACIDOSIS AND TOXIC SYMPTOMS OF SEVERE DIARRHEA OF INFANCY (The Lancet, London, Oct. 29, 1921; Arch. of Ped., February, 1924). In certain of the diarrheas of infancy, symptoms of intoxication, the chief of which is increased pulmonary ventilation, are accompanied by a reduction in the reserve of bicarbonate in the blood plasma. The hypernea and the alkali reserve vary inversely. The reserve can be increased to normal by the administration of sodium bicarbonate. Hypernea is thus controlled and the general toxic symptoms are alleviated, but the ultimate outcome, in the diarrheal cases at any rate, is little influenced. Necropsy throws no light on the questions of the site or extent of the damage done. The usual lesions of gastroenteritis are the only ones found. Depletion of the alkali reserve is not a cause of the diseased condition, but is caused by it and is essentially, like an elevation of temperature or an acceleration of the heart rate, a variation in a physiological constant, an indication of deranged function. And just as fever and tachycardia demand certain therapeutic measures for their own sake, so acidosis indicates the administration of alkali and fluid and the stimulation of excretion. When the acid produced and the cause of its production are known more specific therapy may be available. These observations have confirmed the work of previous investigators.

R. N. Andrews.

ROENTGENOLOGY

SUPERVISORS:
LEO G. RIGLER,
MPLS. GEN'L HOSPITAL, MINNEAPOLIS
A. U. DESJARDINS,
MAYO CLINIC, ROCHESTER

OSSEOUS DEVELOPMENT IN ENDOCRINE DISORDERS: Engelbach and McMahon (Radiology, v. 2, p. 378, June, 1924). This paper, published simultaneously in "Endocrinology," is an attempt to present the changes in time of appearance and time of union of the nuclei and epiphyses of the bones. Numerous charts are presented, giving, in tabulation farm, the usual accepted normal standards, the authors' normal standards, and their method of examination. Their normal standards differ from those of the anatomists, the pediatricians, and the roentgenologists. They believe this is due to a stricter ruling out of slight endocrine disturbances from their group of normals.

The material presented is too extensive to be properly summarized. They believe roentgen examination of the bones may prove to be more valuable in the diagnosis of endocrine disorders than any other form of examination. Their findings in all the bones in hypothyroidism, hypogonadism and eunuchoidism, anterior lobe pituitary insufficiency, pluriglandular syndrome, pubertas, præcox, and thymolymphatism are given with profuse illustrations.

LEO G. RIGLER.

THE DIAGNOSIS OF PRIMARY INTRATHORACIC NEOPLASMS: (Am. Jour. Roent., May, 1924). Eight cases of primary intrathoracic neoplasms in which the diagnosis was correctly made during life are reported. In four of these the roentgen examination was the chief diagnostic measure and the authors believe it is the most important means of diagnosis. They advocate more routine roentgen examinations rather, than as now used, for confirmatory purposes. They emphasize the early use of stereoscopic plates before pleural effusion or lung collapse has appeared as the findings may be obscured by the latter.

A brief discussion of the pathology, symptoms and physical signs is given.

Roentgenologically the cases must be distinguished first from inflammatory processes, second from benign tumors. Tuberculous lobar pneumonia must be distinguished from the massive lobar type of carcinoma and miliary tuberculosis from miliary carcinosis.

Malignant tumors differ from benign in that they are rapidly growing, have an indistinct border, radiate, are multiple, show metastases to ribs and vertebrae and have pleural effusions frequently. Another secondary manifestation of importance is the collapse or complete filling of a lobe due to obstruction of a bronchus by tumor mass.

They advise paracentesis in cases with pleural effusion followed immediately by roentgen examination as the fluid returns very rapidly in malignant cases. They have derived no diagnostic benefit from pneumothorax. Hodgkin's and lymphosarcomata may be distinguished by their rapid response to mild doses of *x*-rays.

Of the eight cases reported there were four carcinomata, one epithelioma, one endothelioma, one chondrosarcoma and one xanthoma.

LEO G. RIGLER.

RONTGENBESTRAHLUNG NACH RADIKALOPERATION DES BRUSTDRUSENKREBSES: W. F. Wassink and C. Ph. Wassink von Raamsdonk (Acta Radiologica, v. 3, p. 113, June, 1924). Three groups of cases of mammary carcinoma, in which roentgenotherapy was employed were considered.

The first, consisting of 78 cases, were operated in their clinic and given heavy doses of radiation within two weeks of the operation.

The second, consisting of 30 cases, were operated elsewhere and were given radiation some time after operation.

The third, consisting of 92 cases, were operated elsewhere, without radiation after operation, and came to them for radiation after recurrence.

In the first two groups very few recurrences were noted while in the third they were frequent. Radiation had very little effect in the recurrent cases. The results in the cases radiated at once after operation indicate that postoperative roentgenotherapy is of considerable value. They could find no case, in which there was no carcinomatous infiltration of the skin, which was harmed by the radiation.

LEO G. RIGLER.

RENAL FLUOROSCOPY AT THE OPERATING TABLE: Braasch and Carman (Radiology, April, 1924). In all cases of operation for kidney stone, where nephrectomy is not contemplated, fluoroscopy of the delivered kidney at the operating table is of value for three reasons: (1) Stones previously unrecognized can be detected; (2) stones can be accurately localized; (3) the removal of all stones can be assured. In many cases pre-operative roentgenograms do not demonstrate all the stones or indicate two stones where one branched one is present. Frequently, it is difficult to locate the stones without needling and incising the cortex, which is very injurious to the kidney. It is often impossible to determine whether all stones or pieces of stones have been removed, if palpation alone is used. Without using this method about 10 per cent of post-operative roentgenograms showed stones which had not been removed. With this method the percentage was reduced to 1.2 per cent.

The important facts in technique are thorough dilatation of the eyes, thorough darkening of the room, and as complete delivery of the kidney through the wound as possible. A short pedicle or fixed kidney may interfere materially with the success of the procedure. The roentgenologist guides the surgeon's forceps to the stone. The authors prefer fluoroscopy to roentgenograms of the delivered kidney, although the latter are of advantage when the kidney cannot be raised above the abdominal wall. They conclude that conservative operation for kidney stone cannot be done with complete success without the aid of fluoroscopy at the operating table.

LEO G. RIGLER.

BOOK REVIEWS

GOITER: NON-SURGICAL TYPES AND TREATMENT. Israel Bram, M.D., Instructor in Clinical Medicine, Jefferson Medical College. 479 pages. Illustrated. New York: The MacMillan Co., 1924.

This monograph on goiter gives a very complete review of the anatomy and physiology of the thyroid gland, with a classification of goiter arranged according to: (1) pathology, (2) clinical signs, (3) therapeusis. The classification under Therapeusis is as follows:

A. Surgical Goiter. Adenomatous, cystic and all other thyroid enlargements not classified under non-surgical goiter.

B. Non-surgical Goiter.

1. Parenchymatous hypertrophy.
2. Colloid goiter.
3. Puberty hyperplasia.
4. Hyperplasia of exophthalmic goiter (Graves disease).

About 100 pages are devoted to the diagnosis, prevention and treatment of simple goiter and puberty hyperplasia and contain nothing that has not been standard for a long time. The balance of the book, some 350 pages, is devoted to the etiology, symptomatology, diagnosis (with a very good review of the various diagnostic tests), prognosis and the author's views as to the treatment and management of all cases of exophthalmic goiter. A considerable number of case histories are presented in support of the author's conclusion that "Surgery, unable to remove the cause of the affection, is a fallacious procedure. Non-surgical measures, the rational therapeusis of exophthalmic goiter, overcoming the dysfunction of the various structures and organs of the body and restoring the interglandular and neuroendocrine relationship, break up the various physical and mental vicious circles with consequent restoration to permanent health.

"All things being equal, the prognosis of Graves' disease under non-operative treatment is excellent; recovery is complete and permanent, and the patient, taught how to 'carry on' and imbued with a healthy philosophy of life, becomes and remains stronger in body and mind than ever before."

The book is profusely illustrated with photographs and charts and has a voluminous bibliography.

HARRY OERTING, M.D.

ASSISTANT WANTED as soon as possible, to do general medical work in clinic. New modern hospital and well-equipped offices. Will pay $200.00 per month and all expenses pertaining to practice. Address Kittson County Clinic, Hallock, Minnesota.

EXCELLENT OPENING in southwestern Minneosta for cost of drugs and office furniture. Good territory. Only physician desires to locate on coast. Good roads; four-year high school; mixed community. Address C-4, care MINNESOTA MEDICINE.

MINNEAPOLIS OFFICE SPACE TO SUBLET — Very desirable office space at 323 La Salle Bldg., Minneapolis, to be sublet by Drs. Willson, Cabot and Wohlrabe. For information call at office or telephone Main 3220.

MEDICAL DOCTOR WANTED at once in city of 4,000 population. Community hospital, good territory. For particulars write Mlinar Drug Store, Hutchinson, Minn.

GRADUATE NURSE wants position in doctor's office. Will furnish references. Address Box 44, Sauk Center, Minn.